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Taxonomic Notes on Ficus Linn., Asia and Australasia Addendum

By E. J. H. Corner

Botany School, University of Cambridge

Summary

New species and varieties.—

subgen. Urostigma, *F. novoguineensis* Corner (New Guinea), *F. heteromeka* Corner (New Guinea); subgen. Pharmacosycea, *F. edelfeltii* King var. *bougainvillei* Corner (Bougainville Isl.); subgen. Ficus sect. Rhizocladus, *F. oxymitroides* Corner var. *brevipes* Corner (New Guinea); sect. Sycidium, *F. gul* Laut. et K. Schum. var. *eubracteata* Corner, (New Guinea), *F. ampelas* Burm. f. var. *hispidula* Corner (Celebes), *F. quercetorum* Corner (New Guinea), *F. imbricata* Corner var. *subcordata* Corner (Bougainville Isl.), *F. arawaensis* Corner (Bougainville Isl.), *F. jaheriana* Corner (Borneo); sect. Sycocarpus, *F. neobritannica* Corner (New Britain), *F. subcongesta* Corner (New Britain) and var. *symmetrica* Corner (Bougainville Isl.), *F. hispidioides* S. Moore var. *flavescens* Corner and var. *succosa* Corner (New Guinea, New Britain), *F. macrothyrsa* Corner (Bougainville Isl.).

Earlier epithet.—*F. amplissima* J. E. Sm. (*F. tsiela* Roxb.).

A journey to New Guinea, New Britain, and Bougainville Island, August to October 1960, enabled me to study the fig-flora of these countries, which I had hitherto known only from the herbarium. That I was able to accomplish so much was due to the great help which I received from the Division of Botany of the Department of Forest, Territory of New Guinea, in particular to the Chief, J. R. Womersley, and his assistant, E. Henty, and to the Forest-Officers E. C. G. Gray and K. J. White. The journey to Bougainville Island was made possible through the hospitality of Mr. F. R.

McKillop, Arawa Plantation near Kieta, with whom Mr. Womersley and I stayed. I tender my grateful thanks to these persons and to the Administration of the Territory of New Guinea which extended much hospitality.

subgen. Urostigma Miq. sect. Leucogyne Corner

F. amplissima J. E. Sm. Rees Cyclop. 14 (1810) n. 68; Miquel, Hook. Lond. J. Bot. 6 (1847) 580; Ann. Mus. Bot. Lugd. Bat. 3 (1867) 287.—*F. tsiela* Roxb. ex Buch. Ham. Tr. Linn. Soc. 15 (1826) 149; Roxburgh, Fl. Ind. 3 (1832) 549.—Smith's species was based solely on Tsiela of Rheede (Hort. Mal. III, 85, t. 63) and is therefore an earlier name than *F. tsiela* Roxb.

subgen. Urostigma Miq. sect. Conosycea (Miq.) Corner

F. novoguineensis sp. nov.—Arbor magna epiphytica suffocans, glabra vel ramuli petiolisque primo puberulis dein glabris, receptaculis primo dense sericeo-pubescentibus. Ramuli 4–5 mm. crassi. Stipulae –18 mm. longae. Lamina 10–18.5 × 3.5–7.5 cm., elliptica, breviter acuminata, basi rotundata v. cuneata, saepe subauriculata, tenue coriacea, levis, sicco brunnea: costis lateralibus utrinsecus 10–14: intercostis –7, vix elevatis: costis basalibus utrinsecus 1 (–2), brevibus: petiolo 15–47 mm. Receptacula axillaria binata, maturitate brunnea v. flavescentia: pedunculo 7–25 × 2 mm., superne haud v. vix dilatato, pilis albis v. aureis 0.5–0.7 mm. longis dense pubescenti: bracteis basalibus 3, 3–6 mm. longis, ovato-acutis, appresse pilosis: corpore receptaculi 18–20 × 17–18 mm., subellipsoideo, dense pubescenti dein glabrescenti, ostiolo plano bracteis apicalibus 3 in discum planum 4 mm. latum instructis occluso: setis internis nullis. Perianthia gamophylla, mascula 2-lobata, feminea 2–3-lobata. Laminae pagina inferior cuticula plicata, ut in *F. annulata* Bl., praedita. Territory New Guinea, New Britain, in silvis. NGF 7863, Morobe District, Wau-Salamana road: NGF 11658 and 12456, Lae Botanic Garden (typus, herb. Lae, eadem arbore collectae): Clemens 1833, Morobe, trail to Wareo, 500 m. alt.: Corner s.n., Rabaul, 4 Oct. 1960.

F. chrysolepidis Miq. affinis, sed receptaculis semper minoribus, pedunculis brevioribus, bracteis basalibus majoribus. Forsan *F.*

chrysolepidis varietas, sed arbores numerosas inspexi et semper distinctas.

subgen. Urostigma (Gasp.) Miq. sect. Malvanthera Corner ser. Malvanthereae subser. Hesperidiiformes Corner

F. heteromeka sp. nov.—Arbor parva, –6 m. alta. Stipulae, costa media, et receptacula breviter albidopubescentes, glabrescentes. Ramuli 8–12 mm. crassi. Stipulae –65 mm. longae. Lamina 14–30 × 6–11 cm., oblongo-elliptica, acuta, basi cuneata, coriacea, integra, sicco cervino-brunnea: costis lateralibus primariis utrinsecus 24–27, angulo lato exorientibus, ut in *F. elastica,* minute brunneo-areolatis: costis basalibus utrinsecus 2, brevibus: petiolo 70–110 × 5 mm. Receptacula axillaria subsessilia, rubro-aurantiaca et rubromaculata: pedunculo 5–7 mm. longo, crasse obconico, ad basim 8 mm. lato, superne 12–14 mm. lato expanso: bracteis basalibus 3, 1 × 5–6 mm., anguste crescentiformibus, caducis: corpore receptaculi 48–65 × 30–35 mm., oblongo-ellipsoideo, ostiolo haud umbonata sed triradiato-inciso: pariete crasso sclerotico. Flores ut in *F. hesperidiiforme* King. Cystolitha hypergena, stomatibus valde immersis. West New Guinea (Adjar, Kebar Valley, 1,100 m. alt., in silvis, incol. *Marapa*): BW 6881 (typus, herb. Leiden).

F. mafulensis Summerh. affinis sed receptaculo haud umbonata, costis primariis lateralibus pluribus.

subgen. Pharmacosycea Miq. sect. Oreosycea Miq. ser. Nervosae Corner

F. edelfeltii King var. **bougainvillei** Corner v. nov. Fig. 1. —Receptacula pedunculis bracteisque basalibus longioribus, bracteis lateralibus 3 saepe praedita: pedunculo 5–28 mm. longo: bracteis basalibus 3, 5–9 mm. longis, ovato-lanceolatis, acutis: pedicello 0–5 mm. longo: bracteis lateralibus 3 (–4), 3–6 mm. longis, ad medium receptaculum vel apicem versus plus minus verticillatis, nonnunquam deficientibus. Bougainville Isl., Crown Prince Mountains et Siwai.

NGF 13559, 13568, 13570 (typus, herb. Lae); J. H. L. Waterhouse B313.

Bracteae laterales in Pharmacosycea singulares.

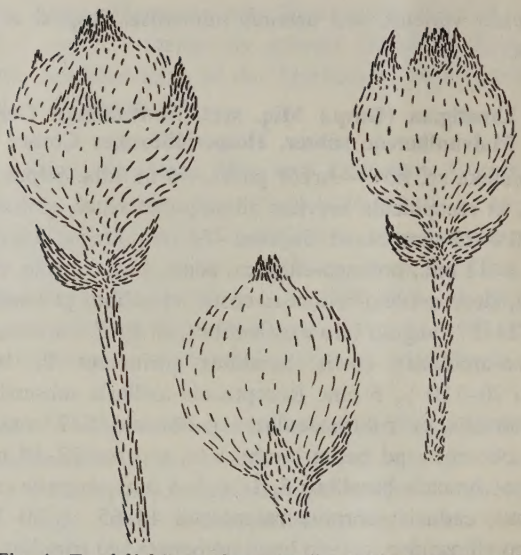


Fig. 1. *F. edelfeltii* var. *bougainvillei* (NGF 13570), × 2.

subgen. Ficus sect. Rhizocladus Endl. ser. Ramentaceae Corner subser. Balanotae Corner

F. oxymitroides Corner var. **brevipes** Corner v. nov. Fig. 2.— Pedunculo breviore, bracteis apicalibus vix projicientibus differt. Glabra, ramuli primo pilis pallidis patentibus 1–3 mm. longis tenue pubescentes. Lamina 4–12 × 1.5–4 cm., ovato-elliptica v. ovato-lanceolata, apicem versus gradatim acuminata: costis lateralibus utrinsecus 4–5, intercostis –4 laxis: costis basalibus $\frac{1}{3}$–$\frac{1}{2}$ laminae: petiolo 4–10 mm. longo. Receptacula 6–10 mm. lata, subellipsoidea, ostiolo plano 2 mm. lato, haud immerso, subannulato, bracteis apicalibus ad 0.5 mm. projicientibus: pedunculo 0.5–2 mm. longo: bracteis basalibus 1.5–2 mm. longis, ovatis, obtusis, appresse puberulis caducis; pedicello 1.5–4 mm. longo: setis internis paucis v. nullis: cellulis scleroticis in pariete interno. New Guinea, in silvis montanis, 300–1,600 m. alt.

F. pantonianam King v. *colobocarpam* Corner revocans sed ostiolo plano et haud rubigino-furfuracea.

NGF 12935 (typus, herb. Lae), Woirrapi, Papua, leg. E. J. H. Corner et E. C. G. Grey, 1,600 m. alt., 24 Aug. 1960; BW 6126, Vogelkop Peninsula, Tehach, south of Lake Ajamaroe, on limestone rocks, 275 m. alt.

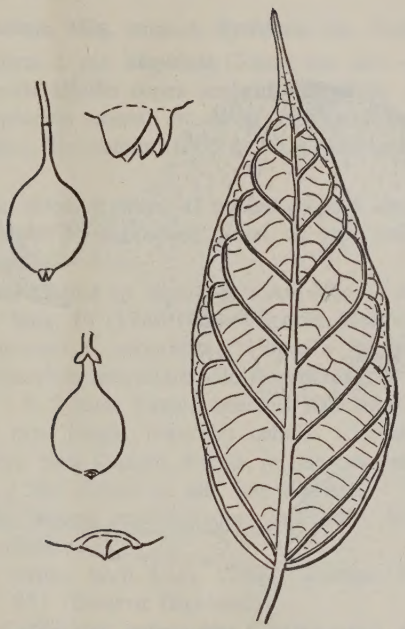


Fig. 2. *F. oxymitroides* (NGF 11418) and var. *brevipes* (lower left, NGF 12935). Leaf × ½, figs × 1.

sect. Sycidium Miq. subsect. Sycidium ser. Phaeopilosae Corner

F. gul Laut. et K. Schum. var. **eubracteata** Corner v. nov. Fig. 3. —Receptacula axillaria, plerumque solitaria, bracteis lateralibus lanceolatis conspicuis, pilis albidis 0.5–1 mm. longis dense villosa, purpurascentia: pedicello 6–14 mm. longo, bracteis lateralibus 7–10 mm. longis, appresse puberulis: corpore receptaculi 10–13 mm. lato (–25 mm. vivo), subpyriformi, bracteis lateralibus lanceolatis 4–8 mm. longis, bracteis apicalibus 2–4 mm. longis projicientibus: setis internis paucis: cellulis sclereticis in pariete nullis. Novellae pilis 1–3 mm. longis dense brunneo-tomentosae. Lamina –30 × 15 cm., elliptica v. ovata, acuminata, basi subcordata, denticulata, supra subscabrida, subtus villosa: costis lateralibus utrinsecus 6–10, basalibus 2, ¼–⅓ laminae elongatis: petiolo 20–70 mm. Terr. New Guinea, Morobe District, pr. Wau, 900 m. alt. pr. rivulo.

Ut v. *solomonensis* Corner sed bracteis lateralibus evolutioribus, ad *F. complexam* Corner approximans.

NGF 12482 (*typus,* herb. Lae), 12483, leg J. A. R. Anderson et E. J. H. Corner, Sept. 11, 1960.

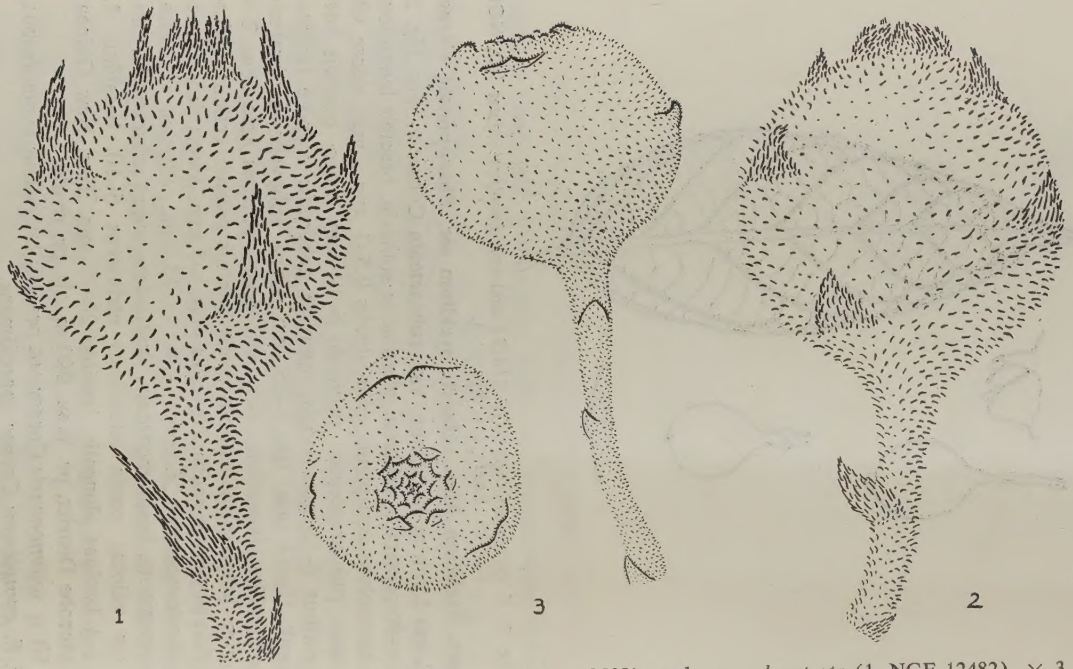


Fig. 3. *F. gul* (3, Carr 15914), var. *solomonensis* (2, NGF 13582), and var. *eubracteata* (1, NGF 12482), × 3.

sect. Sycidium Miq. subsect. Sycidium ser. Scabrae Miq.

F. ampelas Burm. f. var. **hispidula** Corner var. nov.—Lamina pilis erectis minutis albidis supra scabrido-hispidula, subtus velutinata. Receptacula minute et dense hispido-puberula. Celebes (Pangkadjena), Teysmann 11905 et 12242 (*typus* herb. Bogor.): ad lapides.

Receptacula, flores feminei, et semina ut in v. *ampelas,* lamina scabrido-hispidula *F. tinctoriam* Forst. f. ssp. *swinhoei* (King) Corner revocans.

F. quercetorum Corner sp. nov.—*F. tonsa* Miq. v. *aspera* Corner, Gard. Bull. Sing. 17 (1960) 463.—Species ipsa variabilis monticola suffruticosa v. subarborea, villosa v. scabrido-puberula. Lamina scaberrima inequilateralis. Receptacula 8–13 mm. lata: pedunculo 1.5–5 mm. longo: bracteis lateralibus nullis: setis internis –1 mm. longis, copiosis: cellulis scleroticis in pariete copiosis. Terr. New Guinea, Papua, in querceto, nothofageto, et pandaneto, 1,500–2,500 m. alt., late dispersa.

Plantas vivas inspexi speciminaque sicca nova. Forsan *F. odoratae* Blanco affinis.

NGF 4863 (typus, herb. Lae), 12938 (Woitapi, Papua); R. G. Robbins 785, 881 (Eastern Highlands).

F. imbricata Corner var. **subcordata** Corner comb. nov. Fig. 4.—*F. tonsa* Miq. v. *subcordata* Corner, Gard. Bull. Sing. 17 (1960) 464.—Study of living trees in Bougainville Island has shown me that the slender pedunclè and pedicel are characteristic of the alliance of *F. imbricata* and *F. arawaensis,* rather than of the westerly *F. tonsa.* Hence I transfer this variety.

F. arawaensis Corner sp. nov. Fig. 4.—Arbor –12 m. alta, cauliflora, latice albo, foliis distichis, ex integra glabra. Ramuli 2–2.5 mm. crassi. Stipulae 7–12 mm. longae, binatae, lanceolatae, caducae. Lamina 10–27 × 2.5–8 cm., lanceolato-elliptica, acuminata apice 10–20 mm. longo, basi cuneata symmetrica v. latere acroscopico latior, non auriculata, repando-subdentata v. integra, membranacea v. subcoriacea, levis, sicco viridibrunnea: costis lateralibus utrinsecus 11–16, obliquis, vix inarcuatis, subtus elevatis: intercostis 5–11, subtus elevatis: costis basalibus utrinsecus 1, brevibus, glandulis basalibus nullis v. vix evolutis: petiolo 7–14 mm. longo. Receptacula e ramulis efoliatis nodulosis –20 × 4–5 mm. evoluta, e basi trunci ad ramos: pedunculo 4–12 × 0.7 mm.: bracteis basalibus 3, 0.5 mm. longis, obtusis, minutis: pedicello 4–16 mm. longo: corpore receptaculi 9–10 mm. lato, subgloboso, bracteis lateralibus deficientibus,

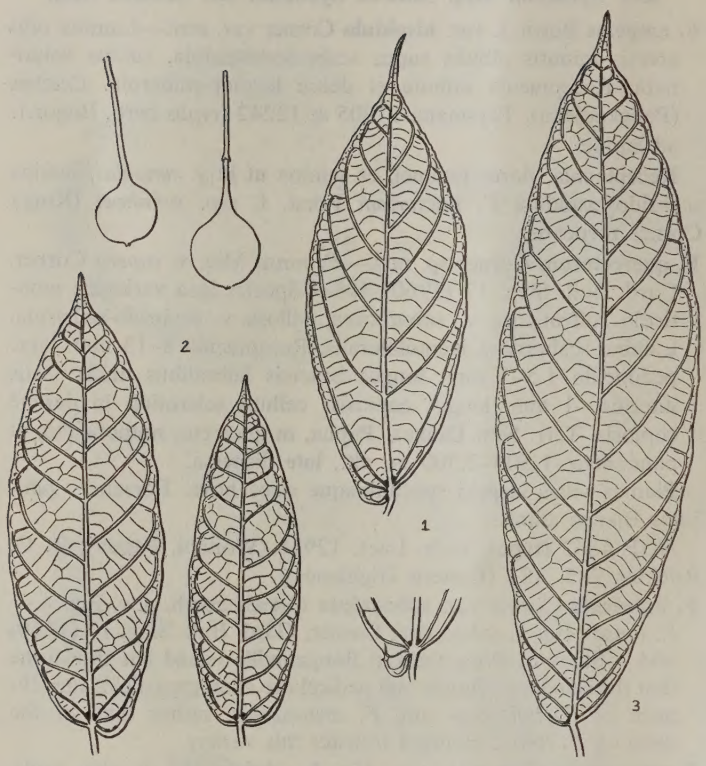


Fig. 4. *F. imbricata* (1, Waterhouse 818), var. *subcordata* (2, NGF 13768), and *F. arawaensis* (3, NGF 13557). Leaves × ½, figs × 1.

apice in statu sicco mamillato, bracteis apicalibus numerosis, minutis, obtusis: setis internis 0.3 mm. longis, numerosis, albidis: cellulis scleroticis nullis. Tepala 4–6 spathulata rubra libera albido-hispidula: pedicellis rubescentibus glabris. Flores masculi ordinibus 2–3 ostiolaribus instructi, pedicellati v. juxta ostiolum sessiles: stamen 1. Flores cecidiophori sessiles v. pedicellati. Cystolitha amphigena. Bougainville Island (Arawa pr. Kieta), NGF 13557 (*typus,* herb. Lae), leg. E. J. H. Corner Oct. 7, 1960.

F. imbricatae Corner affinis sed cauliflora, lamina non auriculata, costis lateralibus pluribus.

sect. Sycidium Miq. subsect. Palaeomorphe (King) Corner ser. Fibrosifoliae Corner

F. jaheriana Corner sp. nov.—Species grandifoliosa, glabra. Ramuli 4–5 mm. crassi, pallide ochracei. Stipulae breves, caducae. Lamina 14–47 × 8–17 cm., oblonga v. late elliptica, apice –30 mm. longo acuminata, saepe asymmetrica, basi cordata, integra, coriacea, supra levis, subtus scabrida, sicco supra grisea, subtus fusco-brunnea: costis lateralibus utrinsecus 6–10, distantibus, subtus valde elevatis, glandulis axillaribus deficientibus v. una in axilla infima: intercostis 1–3, laxis, elevatis: costis basalibus latere latiore 3–4, altero 2–3, brevibus, glandula axillari una. Receptacula ramiflora: pedicello 4–7 mm. longo: corpore receptaculi 5–8 mm. lato, scabridulo, bracteis lateralibus nullis, ostiolo vix immerso: setis internis et cellulis scleroticis nullis. Flores masculi et cecidiophori ut in *F. obscura:* tepalis glabris, minute denticulatis. Flores feminei et semina ? Cystolitha hypogena: fibris sclereidiformibus in mesophyllo copiosis. Borneo (Sungei Tjehen, Kalimintang), leg. (Jaheri 1288 (*typus,* herb. Bogor.), 1289.

Species inter *F. obscuram* Bl. et *F. nidotis* Corner, sed lamina magna valdivenosa basi cordata distinctissima. Fici specierum collectoris insignis, Jaheri, in memoriam dedicata.

sect. Sycocarpus Miq. subsect. Sycocarpus ser. Tuberculifasciculatae Sata subser. Calopilinae Corner

F. neobritannica Corner sp. nov. Fig. 5.—Arbor –10 m. alta, sparsim ramosa, cauliflora, latice albo copioso, foliis spiraliter instructis. Ramuli, stipulae, petioli, nervique pilis obscure v. laete brunneis 1–2 mm. longis hispidi. Ramuli 5–7 mm. crassi (8–10 mm., vivo), internodis brevibus. Stipulae –35 mm. longae, ovato-lanceolatae, hispidae, caducae. Lamina 30–40 × 18–28 cm., obovata, apice 5–18 mm. longo breviter acuminata, basi plus minus cordata, denticulata, membranacea, hispida, supra scabrida, sicco subviridis: costis lateralibus utrinsecus 9–13, marginem versus furcata, glandula axillari ad furcas: intercostis 6–11, sublaxis, subtus leniter elevatis: costis basalibus utrinsecus 3–5, brevibus: petiolo 25–110 mm. longo, hispido, glandula viridi subnodali praedita. Ramuli fertiles efoliati, cauliflori, –20 cm. longi, basi 8–12 mm. crassi, sparsim ramosi, internodis 2–8 mm. longis, congesti, apicibus stipulis 6–9 mm. longis caducis obtectis, hispidi. Receptacula hispido-villosa, maturitate ochracea: pedunculo 5–7 cm. longo: bracteis basalibus 3, in collare plus minus instructis, 5–8 mm. longis, subpersistentibus:

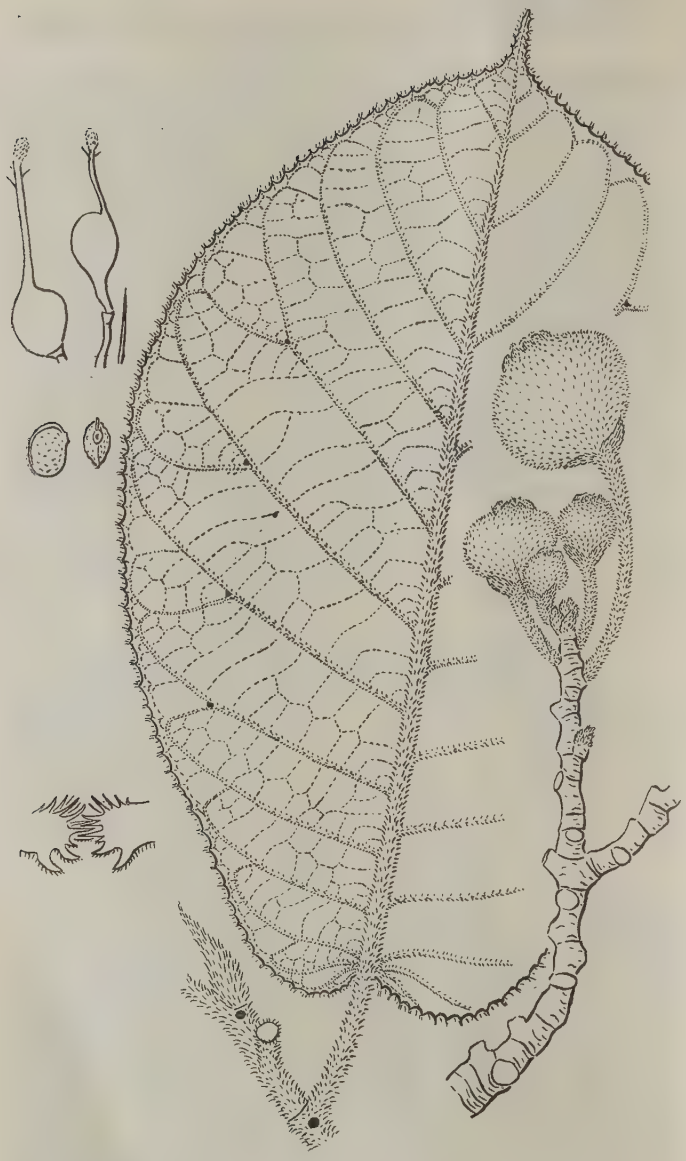


Fig. 5. *F. neobritannica* (NGF 13787). Leaf and figs × ½, female flower and seeds × 8, fig-orifice × 1.

receptaculi corpore 17–22 mm. lato (35–45 mm., vivo), subgloboso v. sicco breviter ellipsoideo, bracteis lateralibus nullis, ostiolo inter bracteas apicales numerosas alte immerso, bracteis apicalibus marginalibus 7–9 gibbosis 3–4 mm. longis: setis internis paucis, 1 mm. longis, pallide brunneis: cellulis scleroticis in pariete receptaculi seminiferi 4–5 mm. crasso nullis. Flores feminei pedicellati: perianthio brevi ad basim ovarii stipitis ut cingula: ovario rufo-brunneo: stylo sparsim barbato. Semina 1 mm. longa, lentiformia, vix carinata, levia v. subasperata, hilo subprominenti. Cystolitha hypogena. New Britain, Keravat, in vallibus arctis in silvis, NGF 13787 (*typus*, herb. Lae).

F. praestantis Corner similis et in silvis congregata, sed receptaculis bracteis lateralibus deficientibus. A *F. pachyrrachis* stipulis caducis, basi laminae plus minus cordato, costis basalibus brevibus, bracteis basalibus brevioribus inter alia differt.

subsect. Sycocarpus ser. Tuberculifasciculatae Sata subser. Congestae Corner

F. subcongesta Corner sp. nov. Fig. 6.—Arbor –20 m. alta. Folia subdisticha v. opposita. Ramuli petioli stipulaeque primo dense appresse fuscobrunneo-hirsuti, pilis 0.5–1 mm. longis: costae subtus pilis fuscobrunneis sparsis praeditae: lamina supra sparsim appresse pilosa. Ramuli 2.5–3.5 mm. crassi. Stipulae 12–20 mm. longae, caducae. Lamina 8–25 × 3–10 cm., elliptica v. obovata, apice 7–15 mm. longo acuminata, basi subcordata v. cuneata, saepe inequilaterali, subdenticulata v. integra, vix scabrida, subcoriacea: costis lateralibus utrinsecus 6–9 v. 8–11, ascendentibus, intercostis –9: costis basalibus utrinsecus 2–3, brevibus: petiolo 10–30 mm. longo, glandula subnodali saepe praedito. Receptacula ramiflora et cauliflora, ad ramulos efoliatos, seminiferos –26 cm. longos sine internodis, cecidiophoros –60 cm. longos internodis 5–20 mm. longis, maturitate carnea v. rufobrunnea: pedunculo 3–20 mm. longo: bracteis basalibus 1–2 mm. longis, lanceolatis, persistentibus: pedicello nullo: corpore receptaculi 9–12 mm. lato (seminifero), 12–17 mm. lato (cecidiophoro), subgloboso, apicem versus 5-gibboso, ostiolo vix depresso: setis internis paucis v. nullis: cellulis scleroticis paucis v. nullis. Perianthium cecidiophorum ovarium rufo-brunneum obtegens v. incisum; femineum ovarium rufo-brunneum obtegens. Stilus femineus glaber v. sparsim et brevissime puberulus. Semina 0.8–0.9 mm. longa, asperata, vix carinata, hilo prominenti. Cystolitha hypogena. New Britain, in silvis.

Fig. 6. *F. subcongesta* (1, NGF 13783; female flowers, NGF 6504), and *F. macrothyrsa* (2, NGF 13571) leaves × ½, figs × 1, flowers × 10.

F. congestae Roxb. in herbario persimilis, sed in statu vivo receptaculis 5-gibbosis, ostiolo haud depresso, minoribus facile distinguenda. Arbores numerosas inspexi.

NGF 13547 (*typus,* herb. Lae), 13783, Keravat; NGF 6504, West Nakanai, Galilo village pr. Cape Hoskins.

var. **symmetrica** Corner v. nov.—Lamina ad basim angustato-cordata symmetrica, arborum juvenilium valde ovato-cordata. Ramuli fertiles stoloniformes a basi trunci ad 3 m. longi orientes, internodis 3–7 cm. longis, 3–4 mm. crassis, plus minus geocarpici: bracteis basalibus 2–3 mm. longis: pedicello in aetate viva 3–7 mm. longo. Bougainville Isl., Crown Prince Mountains, 700–1200 m. alt.; NGF 13735 (*typus,* herb. Lae), 13737.

Small tree –8 m. high: latex white. Leaves spirally arranged to opposite. Twigs, stipules, petioles, and underside of the main veins rather closely appressedly hairy with dark brown hairs 1–1.5 mm. long, the underside of the smaller veins thinly villous with paler spreading hairs –0.5 mm. long: upperside of the lamina thinly white hairy. Twigs 2.5–3 mm. thick. Stipules –15 mm. long. Lamina 12–20 × 5–7 cm., elliptic to elliptic-obovate, acuminate with the tip –17 mm. long, base narrowed cordate and symmetrical, membranous, minutely denticulate, slightly scabrid on both sides, subvillous beneath, drying grey-brown: saplings with ovate-elliptic lamina –26 × 11 cm., base broadly and symmetrically cordate: lateral nerves 6–8 pairs: intercostals 3–6, rather lax, raised below: basal nerves 3 pairs, short: petiole 15–25 mm. long, not elongate in saplings, with a subnodal gland. Figs on stolons –3 m. long from the base of the trunk, superficial and geocarpic, the internodes 3–7 cm. × 3–4 mm., glabrescent, the figs ripening yellowish pink: peduncle 5–15 mm. long: basal bracts 2–3 mm. long, persistent: pedicel 3–7 mm. long (living): body 20–25 mm. wide (living), subglobose, shortly brown hairy, glabrescent, with 5–6 humps round the slightly sunken apical rosette 4–5 mm. wide: internal bristles none: sclerotic cells very few in small clusters round the vascular bundles in the inner wall of the fig. Gall-flowers with the perianth covering the red-brown ovary. Lamina with cystoliths only on the lower side.

In leaf, hairiness, persistent basal bracts, and paucity of sclerotic cells in the fig-wall, this agrees with *F. subcongesta,* but the strongly stoloniferous fruiting twigs and the pedicellate fig-body agree with *F. macrothyrsa.* It was a fairly frequent species in the forest of the Crown Prince Mountains. Further collections may prove its specific rank.

subsect. Sycocarpus ser. Tuberculifasciculatae Sata subser. Hispidae Corner

F. hispidioides S. Moore, J. Bot. 61 (1923) Suppl. 51.

var. **hispidioides**.—Because of inadequate herbarium-material, I confused this species with *F. hispida*. Having recently been able to study many trees in New Guinea, I am convinced that it must be distinguished by the lack of lateral bracts on the figs which are borne on short, branched leafless twigs from the trunk and main branches, and by the more obovate leaf. In *F. hispida* the figs are axillary and then developed in hanging racemes, or they are produced from stolons at the base of the trunk. True *F. hispida* has rarely been collected in New Guinea (Carr 11128, Papua), though there are several collections from Queensland. The figs on different trees of *F. hispidioides* show such differences that I distinguish three varieties. The type of *F. hispidioides* in the British Museum has the small, rounded or somewhat depressed fig, and I associate with it the trees which I found with figs that turned pink to red-brown on ripening, though there is no note of the colour of the fig in the type.

Coll. Forbes s.n. Kerepunu, Papua (type); Corner s.n. Blamey's Retreat, Rouna, Papua, Oct. 1960.

var. **flavescens** Corner v. nov.—Receptacula maturitate flava, pyriformia, 18–22 m. lata (25–35 mm., vivo): pedunculo –30 mm. longo. Papua, New Britain, in silvis, saepe riparia, et in vallibus arctis sub Eucalypto.

Carr 11316, 11489 (Kanosia); Corner s.n. Brown River, et s.n. Blamey's Retreat, Rouna Valley; NGF 12591, Rouna Valley (*typus*, herb. Lae), 13778 (Keravat, New Britain).

var. **succosa** Corner v. nov.—Receptacula maturitate flava, depresso-globosa 25–35 mm. lata (5–7 cm., vivo): bracteis basalibus 3–4 × 2.5–3.5 mm. Ramuli, petioli, costae subtus plus minus albido-villosi. Terr. New Guinea, Papua, New Britain, in silvis, saepe riparia.

Brass 28080 (Sudest Isl., Rambuso, det. *F. calopilina*); Corner s.n. Lae, et s.n. Bulolo, 1960; Hoogland 3372 (Popondetta, det. *F. calopilina*); NGF 5700 (*typus*, herb. Lae), pr. Lae: NGF 13552 (Rabaul).

This variety has been much confused by myself and others with *F. calopilina*, which is a mountain species with brown setose-hairy figs.

subsect. Sycocarpus ser. Tuberculifasciculatae Sata
subser. Tuberculifasciculatae

F. macrothyrsa Corner sp nov.— Arbor –15 m. alta, cauliflora, latice albo. Folia disticha v. apud ramulos opposita inequalia. Ramuli petioli pilis albidis v. brunneolis –1 mm. longis sparsim appresse hirsuti, costae subtus sparsius. Ramuli 3–4 mm. crassi. Stipulae –25 mm. longae, caducae. Lamina 12–20 × 5–10 cm., elliptica, subasymmetrica, apice –12 mm. longo acuminata, basi plus minus asymmetrica, uno latere rotundata, altero cuneata, binarum minor symmetrica et subcordata, integra, tenuiter coriacea, levis, sicco pallide brunneo: costis lateralibus utrinsecus 6–8 inarcuatis, intercostis 2–4 laxis: costis basalibus utrinsecus 1–2 brevibus: petiolo 10–30 mm. longo, glandula subnodali saepe praedito. Receptacula e ramulis elongatis efoliatis glabris –2 m. longis, basi 10–15 mm. crassis, internodis 10–40 mm. longis, producta, a parte basali trunci pendentibus, inferioribus ad terram crescentibus haud geocarpicis, ramulis longis paucis, ramulis brevibus –4 cm, longis receptacula congesta gerentibus numerosis, ipsa maturitate brunnea: pedunculo 5–20 mm. long: bracteis basalibus 3, 1.5–3 mm. longis, lanceolatis, caducis: pedicello 1–5 mm. longo: corpore receptaculi 14–17 mm. lato, depresso-globoso, subtruncata, e basi ad bracteas apicales 5–6 subgibbosas leniter costato, ostiolo haud depresso: setis internis brevibus, albidis, sparsis: cellulis scleroticis in pariete receptaculi cecidiophori copiosis. Perianthium cecidiophorum ovarium rufobrunneum obtegens. Flores feminei ? Cystolitha hypogena. Bougainville Island (Crown Prince Mts.), in silvis prope rivulos 500 m. alt., NGF 13571 (*typus*, herb. Lae).

Inter *F. subcongestam* Corner et *F. arfakensem* King sed receptaculo pedicellato bracteis basalibus caducis, ramulis stoloniformibus robustis distincta. Ad specimina *F. arfakensis* ex insulis Solomonensibus approximans sed his modis et laminis receptaculisque majoribus distincta.

A New Species of Goniothalamus from Peat Swamp Forest in Borneo

By James Sinclair

Mr. J. A. R. Anderson of the Forest Department, Kuching, Sarawak has, on several occasions, sent me duplicates of a *Goniothalamus* from Borneo which he could not match and which he wished to include for publication in his paper, "The Flora of the Peat Swamp Forests of Sarawak and Brunei, including a catalogue of all recorded species of flowering plants, ferns and fern allies." When I visited Sarawak and Brunei last year, July to September 1960, he again reminded me about it and showed me more sheets of it in the Herbarium at Kuching. It has been found in several localities in Sarawak and Brunei and is confined mostly to peat swamp forest or wet forest with a certain amount of peat. Ashton obtained it from the *Shorea albida* swamps at Seria and Bukit Puan in Brunei where there is some sand in the soil as well as peat. I looked for it in these and other localities in Brunei, but unfortunately did not find it myself. I am now describing it as a new species and have named it in honour of J. A. R. Anderson.

Goniothalamus andersonii J. Sinclair, **sp. nov.—Fig. 1.**

Species affinis *G. tavoyensi* et *G. tapi;* a priore foliis magis coriaceis, nervis pluribus, sepalis obtusis, petalis exterioribus longioribus, stipitibus carpellorum longioribus distinguitur; ab altero ramulis atro-fuscis (non rubro-brunneis nec stramineis), foliis in sicco pallidioribus, carpellis stipitatis recedit.

Arbor 10–15 m. alta. *Cortex* atrofuscus, levis, odoratus. *Ramuli* atro-fusci vel nigrescentes, striati, glabri. *Folia* coriacea vel subcoriacea, elliptico-oblonga vel oblonga, supra brunneo-viridia in sicco, interdum nitida, subtus pallidiora, apice rotundata obtuse apiculata, basi acutiuscula, 12–21 cm. longa, 5–8 cm. lata; costa supra insculpta, subtus elevata; nervi 10–14-jugati, graciles, utrinque elevati, prominuli, nervi secundarii primariis breviores; reticulationes graciles utrinque visibiles; petioli 1.5–2 cm. longi. *Flores* solitarii, axillares vel ex axillis foliorum delapsorum orti. *Pedicelli* tenues, 1 cm. longi. *Sepala* coriacea, semiorbiculata, reticulata, prope basin cordata, immo basi connata, 5 mm. longa, 1 cm. lata. *Petala* flava; exteriora puberula, 4 cm. longa, medio 1 cm. lata, supra medium longe et anguste acuminata, basi truncata; interiora in partibus liberis

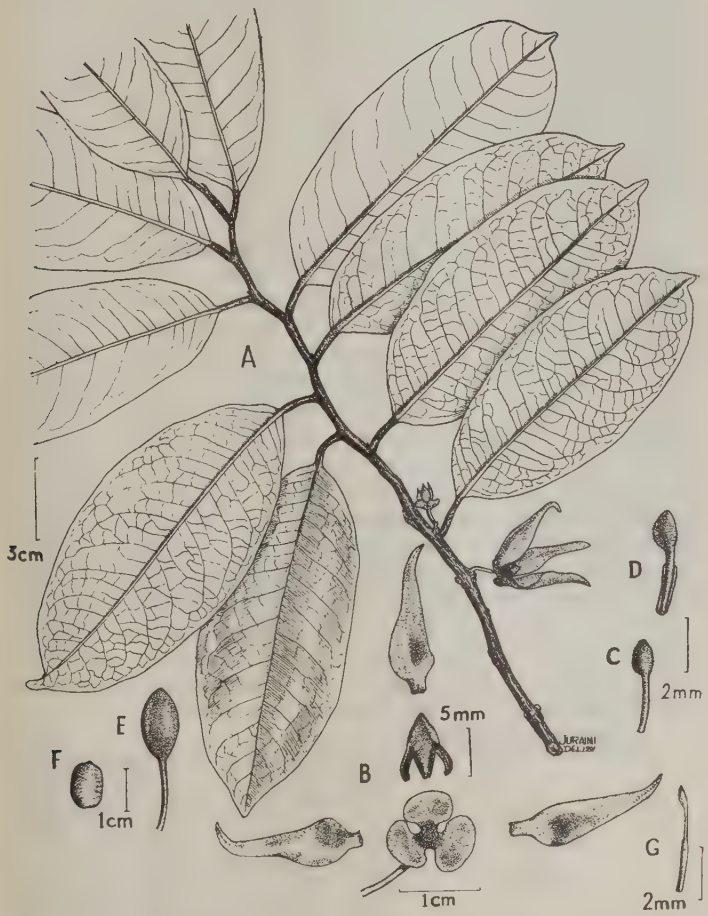


Fig. 1. *Goniothalamus andersonii* J. Sinclair.

A, twig with leaves and flowers. B, dissection of flower to show calyx, outer and inner petals. C, staminode or infertile outer stamen. D, stamen. E, carpel. F, seed. G, ovary with style and stigma. All drawings from *Ashton, Smythies & Wood SAR 5901* (SING holotype).

tomentella, intus glabra, mitriformia, apice acuta, 8 mm.–1 cm. longa, 3–4 mm. lata. *Stamina* 2 mm. longa, connectivis tomentellis obtuse apiculatis. *Ovaria* 2.5–3 mm. longa, anguste cylindrica; stigma glabra, infundibuliforme. Carpella late elliptica, glabra, 1.5 cm. longa, 1 cm. lata; stipites 1.3–1.5 cm. longi, tenues, 2 mm. crassi. *Semen* 1, nitidum badium, 1.2 cm. longum, 8 mm. latum.

Tree 10–15 m. high. *Bark* very dark brown, smooth, sweet-scented. *Twigs* dark brown or blackish, striate, glabrous. *Leaves* coriaceous or sub-coriaceous, elliptic-oblong or oblong, brownish green above when dry, also sometimes glossy, paler and dull beneath, apex rounded and then bluntly apiculate, base somewhat acute; midrib sunk and grooved above, raised beneath; nerves 10–14 pairs, slender, raised on both surfaces, slightly prominent, secondary nerves present but shorter than the primary; reticulations fine, but visible on both surfaces; length 12–21 cm.; breadth 5–8 cm.; petiole 1.5–2 cm. long. *Flowers* solitary, axillary or from the axils of fallen leaves. *Pedicels* thin, 1 cm. long. *Sepals* coriaceous, semi-circular, reticulate, cordate near the base, connate at the very base, 5 mm. long and 1 cm. broad. *Petals* bright yellow, the outer puberulous, 4 cm. long, 1 cm. broad at the middle, narrowed and drawn out into a long acumen above the middle, truncate at the base; the inner tomentulose on the exposed parts, glabrous inside, mitriform, acute at the apex, 8 mm.–1 cm. long and 3–4 mm. broad. *Stamens* 2 mm. long, the connectives obtusely apiculate and tomentulose. *Ovaries* 2.5–3 mm. long, narrowly cylindrical; stigmas glabrous, funnel-shaped. *Carpels* broadly elliptic, glabrous, 1.5 cm. long and 1 cm. broad; stalks 1.3–1.5 cm. long, slender, 2 mm. thick. *Seed* 1, shining, chestnut brown, 1.2 cm. long and 8 mm. broad.

BORNEO SARAWAK:	3rd Division:—Sungei Pasir, Kut Siong P.F., *Anderson SAR 125* (SAR); Batang Igan, Tanjong Kelapu, Sibu, *Anderson SAR 689* (SAR, SING); Naman F.R., Sibu, *Sanusi b. Tahir SAR 5062* (SAR); Daro F.R., Surong Irit, Binatang, *Sanusi b. Tahir SAR 5236* (SAR).
BRUNEI:	Bukit Puan, *Ashton SAR 7864* (SAR, SING); Seria, *Ashton, Smythies & Wood SAR 5901* (SAR, SING); Badas, Research Plot 9/2, *Hassan SAR 2851* (SAR, SING).
DISTRIBUTION:	Sarawak and Brunei in peat swamp forest.
TYPE MATERIAL:	*Ashton, Smythies & Wood SAR 5901* (SAR, SING holotype).
VERNACULAR NAMES:	*Selukai* (Iban); *pudin* (Milanau); *serbah semangun* (Malay).
USES:	The bark is used as a repellent against mosquitoes.

A tree of the peat swamp forest with blackish twigs, rather coriaceous, elliptic-oblong, finely veined leaves, tomentulose, slightly apiculate anther connectives and 1-seeded, stalked, elliptic carpels. Because of the apiculate connectives and the somewhat similar leaves, it would appear to be related to *G. tavoyensis* and *tapis* and nearest to the former. It differs from it, however, in the more coriaceous leaves with more veins, the obtuse semi-orbicular sepals, the longer outer petals and the longer carpel stalks. It differs from *tapis* in the blackish twigs, the colour of the leaves on drying, the less sharply apiculate connectives and in the stalked carpels. In *tapis* the young twigs are reddish brown, the older pale grey or straw-coloured while the leaves dry a dull, dark brown above and a medium brown beneath and the carpels are sessile. There is also some superficial resemblance to the Ceylon *G. hookeri,* a species with somewhat similar though broader leaves and black twigs, but that plant would fall in another group because of its convex or flat-topped anther connectives. Its acute sepals and smaller flowers would also distinguish it from *andersonii.*

G. andersonii, apart from its affinities with these three above-mentioned species, will not readily be mistaken for any of them. It is more likely to be confused, especially in the herbarium with sterile material of *G. malayanus,* a species of similar habitat in peat swamp forest in Borneo. *G. malayanus* however, is a shrub and has narrower, glossy leaves and pale straw-coloured twigs. The stamen connectives are flat-topped or slightly convex and the carpels oblong with 2–5 seeds.

Florae Malesianae Precursores—XXXI

The Genus Knema (Myristicaceae) in Malaysia and outside Malaysia

By James Sinclair

INTRODUCTORY PART

Explanation and Scope of this paper

This paper deals primarily with the description and distribution of the Malaysian species of *Knema* outside the Malay Peninsula. The Malay Peninsula species have already been revised by me in *Gardens' Bulletin,* Singapore 16 (1958) but their distribution outside Malaya, if any, is now given with a citation of specimens. The descriptions of those species, occurring in Malaya, are not repeated, but some extra notes or new facts regarding them have been added if deemed necessary for a better understanding of the genus. The extra-Malaysian species had to be examined as well and are also revised here with full descriptions and notes on distribution. The actual non-Malaysian species are so few in number (three species and one variety) that the additional task of including them in the present account was in no way a burden. Thus my first paper "A Revision of the Malayan Myristicaceae" in *Gardens' Bulletin,* Singapore 16 (1958) when taken in conjunction with this one, will form an account of all the known species in the genus *Knema.*

In August 1960 I visited Sarawak and Brunei to make a special study of Myristicaceae in the field. The original draft of this paper had then to be altered to incorporate extra notes on bark and field characters with the addition of new records, a few new varieties and the change in status of one variety to that of a species.

Conspectus and Number of the Accepted Species after Revision

After revising *Knema,* I found that there are 37 species, 13 varieties and 1 form altogether, with 34 species, 12 varieties and 1 form in Malaysia. The other 3 species and 1 variety, namely *K. attenuata, erratica, linifolia* and *cinerea* var. *andamanica* are Indian, but *erratica* occurs in China (Yunnan), Burma and Siam as well. Warburg lists some 39 species and 18 varieties in his monograph, while Merrill adds a further 7 species in his "Enumeration

of the Philippine Flowering Plants". Some 6 further names were created by various authors since Warburg, but of these only one still stands, namely *K. membranifolia* Hubert Winkler. I have arranged the species in alphabetical order in the text, each with a preceding numeral. Each species is given the same corresponding number in the keys. During my short visits to other herbaria in 1959, I found that this alphabetical arrangement was the easiest and quickest for adding collectors' numbers and localities to my manuscript. The following is the revised list of species and varieties in the genus.

Revised list of species and varieties of Knema

1. K. ashtonii J. Sinclair, **sp. nov.**
2. attenuata (Hk. f. et Th.) Warb.
3. cinerea (Poir.) Warb.
   - var. cinerea
   - var. andamanica (Warb.) J. Sinclair, **comb. nov.**
   - var. cordata (J. Sinclair) J. Sinclair, **comb. nov.**
   - var. patentinervia (J. Sinclair) J. Sinclair, **comb. nov.**
     - f. patentinervia
     - f. longipedicellata J. Sinclair, **f. nov.**
   - var. rubens (J. Sinclair) J. Sinclair, **stat. nov.**
   - var. sumatrana (Miq.) J. Sinclair, **comb. nov.**
4. communis J. Sinclair
5. conferta (King) Warb.
6. curtisii (King) Warb.
   - var. curtisii
   - var. amoena J. Sinclair, **var. nov.**
   - var. arenosa J. Sinclair, **var. nov.**
   - var. linguiformis J. Sinclair, **var. nov.**
   - var. paludosa J. Sinclair, **var. nov.**
7. elmeri Merr.
8. erratica (Hk. f. et Th.) J. Sinclair, **comb. nov.**
9. furfuracea (Hk. f. et Th.) Warb.
10. galeata J. Sinclair, **sp. nov.**
11. globularia (Lamk) Merr.
12. glomerata (Blanco) Merr.
13. hookeriana (Hk. f. et Th.) Warb.
14. intermedia (Bl.) Warb.
15. kinabaluensis J. Sinclair, **sp. nov.**
16. korthalsii Warb.
17. kunstleri (King) Warb.
    - var. kunstleri
    - var. surigaoensis J. Sinclair, **var. nov.**
18. latericia Elmer
    - var. latericia
    - var. albifolia J. Sinclair, **var. nov.**
    - var. lunduensis J. Sinclair, **var. nov.**
19. latifolia Warb.
20. laurina (Bl.) Warb.
21. linifolia (Roxb.) Warb.
22. malayana Warb.
23. mandaharan (Miq.) Warb.
24. membranifolia H. Winkler
25. muscosa J. Sinclair, **sp. nov.**
26. oblongifolia (King) Warb.
    - var. oblongifolia
    - var. monticola (King) Warb.
27. pectinata Warb.
28. percoriacea J. Sinclair, **sp. nov.**
29. plumulosa J. Sinclair
30. retusa (King) Warb.
31. rigidifolia J. Sinclair
32. rufa Warb.
33. scortechinii (King) J. Sinclair
34. stenophylla (Warb.) J. Sinclair
35. tomentella (Miq.) Warb.
36. uliginosa J. Sinclair, **sp. nov.**
37. woodii J. Sinclair, **sp. nov.**

New Species

The following 7 are new species described in this paper:—

Knema ashtonii, K. galeata, K. kinabaluensis, K. muscosa, K. percoriacea, K. uliginosa and *K. woodii.*

New Varieties

The following 7 are new varieties:—

K. curtisii var. *amoena,* var. *arenosa,* var. *linguiformis* and var. *paludosa; K. kunstleri* var. *surigaoensis; K. latericia* var. *albifolia* and var. *lunduensis.*

New Forms

K. cinerea var. *patentinervia* f. *longipedicellata* is a new form.

New Combinations

The following 5 are new combinations:—

K. cinerea var. *andamanica* (Warb.), var. *cordata* (J. Sinclair), var. *patentinervia* (J. Sinclair) and var. *sumatrana* (Miq.); *K. erratica* (Hk. f. et Th.).

New Status

The following receives new status:—

K. cinerea var. *rubens* (J. Sinclair), raised from a form to a variety.

New Synonyms

The following 26 are new synonyms:—

a. Species reduced:—*K. acuminata* Merr., *K. alvarezii* Merr., *K. angustifolia* (Roxb.) Warb., *K. cenabre* Merr. & Quisumb., *K. elegans* Pierre ex Warb., *K. insularis* Merr., *K. lenta* Pierre ex Warb., *K. mindanaensis* (Warb.) Merr., *K. nitida* Merr., *K. peltata* (Roxb.) Warb., *K. pierrei* Warb., *K. siamensis* Warb., *K. stellata* Merr., *K. stenocarpa* Warb., *K. umbellata* Warb., *K. vidalii* Warb., *K. winkleri* Merr.

b. Binomials transferred from a synonym of one species to that of another species:—*M. gibbosa* Hk. f. et Th. formerly a synonym of *K. angustifolia* (Roxb.) Warb. becomes a syn. of *K. cinerea* var. *andamanica* (Warb.) Sinclair. *K. bicolor* Raf., a syn. of *K. corticosa* Lour. becomes a syn. of *K. globularia.*

c. Varieties not recognized as distinct and included in their species:—*K. attenuata* var. *latifrons* Warb., *K. linifolia* var. *clarkei* (King) Warb.

d. Varieties transferred to another variety or species:—*K. conferta* var. *tonkinensis* Warb. becomes *K. laurina* (Bl.) Warb. *K.*

glauca var. *bancana* Warb. becomes *K. tometella* (Miq.) Warb. *K. glauca* var. *nicobarica* Warb. becomes (1) *K. cinerea* var. *andamanica* (Warb.) Sinclair and (2) *K. laurina* (Bl.) Warb. *K. intermedia* var. *minor* Miq. becomes *K. cinerea* var. *sumatrana* (Miq.) Sinclair. *K. laurina* var. *minahassae* Warb. becomes *K. tomentella* (Miq.) Warb.

New Records

The following are new records for the Malay Peninsula and are not described in my first paper "A Revision of the Malayan Myristicaceae":—*K. ashtonii* and *K. curtisii* var. *paludosa.*

K. globularia is now known from (1) Pulau Beras, Atjeh, Sumatra and also from (2) Pulau Karas in the Riouw Archipelago. Other *Knema* species in Borneo, previously known from only one region, are now known to occur in several of the Bornean territories, thanks to the work of collectors such as Kostermans, Anderson, G. H. S. Wood and Ashton. For a complete account and discussion see under the section *Geographical Distribution.*

Total Number of New Species

In undertaking the revision of *Knema* the total number of new species, including those from the Malay Peninsula, described by me is 10, representing a percentage of 27 if the total number of species is reckoned as 37. This does not include the new varieties, nor *K. stenophylla* transferred from *Gymnacranthera.* We can say in general terms that a quarter of the species are new. It will be seen from the index that there are some 79 binomials under *Knema.* 42 of these are either synonyms or names which cannot be used. The latter figure represents a percentage of 53.

Vernacular Names

The common vernacular names used in Sumatra, Malaya, Java and Borneo such as *chendarah, chendaharan, dara-dara, darahan, penara, pendarah, pendarahan* and *penarahan* for *Knema,* are equally applicable to the other genera of the *Myristicaceae* and it is not necessary to repeat them under each species. Vernacular names are therefore given only when they differ from the abovementioned.

Geographical Distribution

Numerical Assessment of the species in the Geographical Divisions

Having now revised material from all areas, I am in a better position to give a more accurate and complete account of the distribution of each species and to draw general conclusions than I

was in 1958, when the revision of the Malayan species only was published. The species composition of each geographical division is now shown. Endemic species are in bold type.

MALAYSIAN SPECIES

SUMATRA: *K. cinerea* vars. *cordata, patentinervia* f. *patentinervia,* var. *rubens* and var. *sumatrana; K. conferta; K. curtisii* vars. *curtisii, arenosa* and *paludosa; K. furfuracea; K. globularia; K. hookeriana; K. intermedia; K. latericia* var. *latericia; K. latifolia; K. laurina; K. malayana; K. mandaharan; K. scortechinii.* Total 13 species including 6 vars. Endemic none.

MALAY PENINSULA: *K. ashtonii; K. cinerea* vars. *cordata, patentinervia* f. *patentinervia,* var. *rubens* and *sumatrana; K. communis; K. conferta; K. curtisii* vars. *curtisii* and *paludosa; K. furfuracea; K. globularia; K. hookeriana; K. intermedia; K. kunstleri* var. *kunstleri; K. latericia* var. *latericia; K. laurina; K. malayana; K. mandaharan;* **K. oblongifolia** vars. **oblongifolia** and **monticola; K. plumulosa; K. retusa; K. rigidifolia;** *K. scortechinii;* **K. stenophylla.** Total 20 species including 6 vars. Endemic 5 species + 1 var.

JAVA: *K. cinerea* var. *sumatrana; K. intermedia; K. laurina.* Total 3 species including 1 var. Endemic none.

LESSER SUNDA ISLANDS: *K. cinerea* wars. *cinerea* and *sumatrana.* Total 1 species + 1 var. Endemic none.

BORNEO: *K. ashtonii; K. cinerea* vars. *cordata, patentinervia f.* **longipedicellata,** vars. *rubens* and *sumatrana; K. communis; K. conferta; K. curtisii* vars. *curtisii,* **amoena,** *arenosa,* **linguiformis** and *paludosa;* **K. elmeri;** *K. furfuracea;* **K. galeata;** *K. intermedia;* **K. kinabaluensis;** *K. korthalsii; K. kunstleri* var. *kunstleri; K. K. latericia* vars. *latericia,* **albifolia** and **lunduensis;** *K. latifolia; K. laurina;* **K. membranifolia; K. muscosa; K. pectinata; K. percoriacea; K. rufa; K. uliginosa; K. woodii.** Total 22 species including 9 vars, and 1 form. Endemic 10 species + 4 vars. and 1 form.

PHILIPPINES: **K. glomerata;** *K. korthalsii; K. kunstleri* vars. *kunstleri* and **surigaoensis;** *K. latericia* var. *latericia; K. tomentella.* Total 5 species + 1 var. Endemic 1 species and 1 var.

CELEBES: *K. cinerea* var. *cinerea; K. tomentella.* Total 2 species. Endemic none.

MOLUCCAS: *K. cinerea* var. *cinerea; K. tomentella.* Total 2 species. Endemic none.

NEW GUINEA: *K. tomentella.* Total 1 species. Endemic none.

EXTRA MALAYSIAN SPECIES

CHINA:	*K. erratica; K. globularia.* Total 2 species. Endemic none.
FORMOSA:	No *Knema* species has yet been found here. *Myristica glomerata* (Blanco) Kudo & Masamune is not *K. glomerata* (Blanco) Merr. but *Myristica cumingii* Warb. One should look out for *K. glomerata.*
INDIA:	**K. attenuata;** *K. cinerea* var. *andamanica; K. erratica; K. linifolia.* Total 4 species including 1 var. Endemic 1 species.
BURMA:	*K. cinerea* var. *andamanica; K. erratica; K. globularia; K. laurina; K. linifolia.* Total 5 species including 1 var. Endemic none.
ANDAMANS:	*K. cinerea* var. *andamanica.* Total 1 species. Endemic none.
NICOBARS:	*K. cinerea* var. *andamanica; K. laurina.* Total 2 species including 1 var. Endemic none.
INDO-CHINA:	*K. cinerea* var. *andamanica; K. furfuracea; K. globularia; K. latericia* var. *latericia; K. laurina; K. linifolia.* Total 6 species including 1 var. Endemic none.
SIAM:	*K. cinerea* vars. *andamanica* and *sumatrana; K. erratica; K. furfuracea; K. globularia; K. laurina; K. linifolia; K. malayana.* Total 7 species including 2 vars. Endemic none.

From a glance at this enumeration showing the number of species in each region, it will at once be seen, that the chief centre of distribution of *Knema* is in Borneo. The total number of species is given as 22. There is a second centre of distribution in the Malay Peninsula with 20 species and 6 varieties, and a third if we like to call it so in Sumatra where the number of species drops to 13 with 6 varieties. As we proceed eastwards the number of species falls off to 1 in New Guinea. Borneo also has the highest number of endemic species, namely 10 and 4 varieties, while there are now only 5 and 1 in the Malay Peninsula. These endemics, namely *oblongifolia, plumulosa, retusa, stenophylla* and *rigidifolia* are all very distinct plants. In my first publication "A Revision of the Malayan Myristicaceae", there were several more so-called "endemics", but now after examining a great deal of extra material, the number has dwindled to 5 since many of them have turned up either in Sumatra or in Borneo. Also recent collections from Borneo have brought the number down. I have to stress once more the disadvantage of a local flora as against the superiority of one like Flora Malesiana embracing a wide area. Therefore, this present

paper should be used as a guide to the distribution of *Knema* as the information about it in the first account is now incomplete. It will also be seen that Sumatra contains no known endemics and that there are no *Knema* species there but which do not occur in the Malay Peninsula. This may not always be the case, but there is little or no botanical exploration undertaken in Sumatra at present.

Distribution in the separate provinces of Malaya and in the territories of Borneo

(*a*) *Malay Peninsula*

In my first paper, in a section on page 210, entitled "Scope for future work" I stressed that records of species for the individual states in Malaya were still incomplete and expressed hope that some more might be obtained. The paper was completed and handed to the press at the beginning of 1957. Since then, it is gratifying to announce that the following records have been obtained for the first time:—

Kelantan, *K. cinerea* var. *patentinervia* f. *patentinervia; communis; furfuracea; hookeriana* and *malayana*. Trengganu, *K. kunstleri* var. *kunstleri*. Selangor, *K. curtisii* var. *curtisii*. Negri Sembilan, *K. kunstleri* var. *kunstleri; scortechinii* and *stenophylla*.

(*b*) *Brunei*

I have found no records of any Myristicaceae from Brunei ever published, not even in Warburg's monograph. Neither have I seen a single *Knema* in any herbaria collected by any field workers of the older generation. Obviously this is because this region was not explored botanically in the past. The only records of *Knema* are the ones of present day collectors, now published here. The majority of the specimens have been collected by P. S. Ashton but there are also a few others gathered by Anderson, Smythies, Sow, Whitmore, G. H. S. Wood and by myself when I went to Brunei and Sarawak in August 1960 to make a special study of Myristicaceae in the field. The species and varieties now recorded for Brunei are listed here, but a few more may be expected to turn up.

K. ashtonii; K. cinerea vars. *cordata* and *sumatrana; K. curtisii* vars.*amoena* and *curtisii; K. elmeri; K. furfuracea; K. galeata; K. kunstleri* var. *kunstleri; K. latericia* var. *latericia; K. latifolia; K. laurina; K. membranifolia; K. percoriacea* and *K. rufa*.

(*c*) *Sarawak*

Most of the records from Sarawak have been supplied by Beccari and J. A. R. Anderson. New additions are *K. latericia* var. *lunduensis* by Purseglove and then by myself, *K. percoriacea* by myself, *cinerea* var. *cordata* and *K. woodii* by M. Jacobs (Leiden) and *uliginosa* by Anderson. *K. pectinata* was obtained by M. Jacobs with female flowers. It was originally known from a single gathering by Beccari with male flowers. I also found it in fruit on Matang. G. H. S. Wood discovered it in North Borneo in fruit. *K. rufa* was found by me in fruit. It was previously obtained by Beccari only once when he collected it in flower. Such information as is given here about distribution and new records in Sarawak may soon be out of date. It is now possible to reach Gunong Gaharu (where I collected recently) and beyond almost to the Indonesian border by a new and good road. The total distance inland from Kuching is about 80 miles. It is sad and regrettable to state that many of the forests in the immediate neighbourhood of Kuching, the locus classicus where Beccari obtained many types, have long ago disappeared. I cannot but shed a silent tear or curse the woodman and his master when I think of the future fate of tall stately denizens of the forest, some of which have taken 200 years or more to reach their present gigantic grandeur of 100 feet or more. Rarities like *K. rufa* may be no more and the commonest species may, even in time, become relics.

(*d*) *British North Borneo*

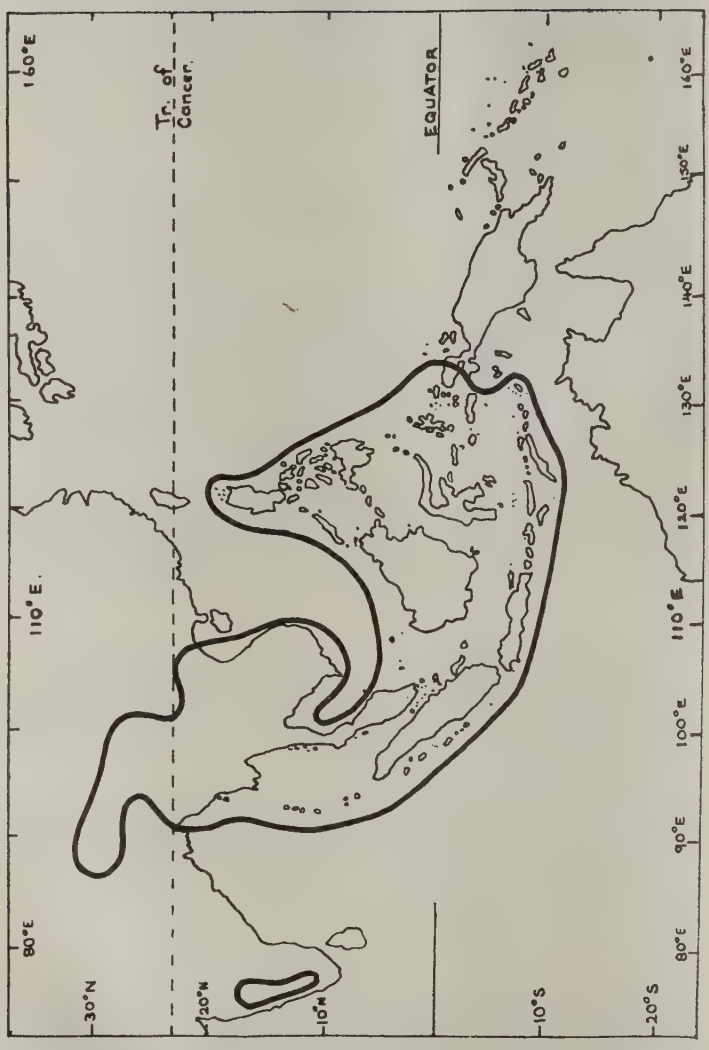
Besides *pectinata* from British North Borneo, Wood and Wyatt-Smith collected *ashtonii*. Onggib obtained *galeata*.

(*e*) *East and North East Borneo*

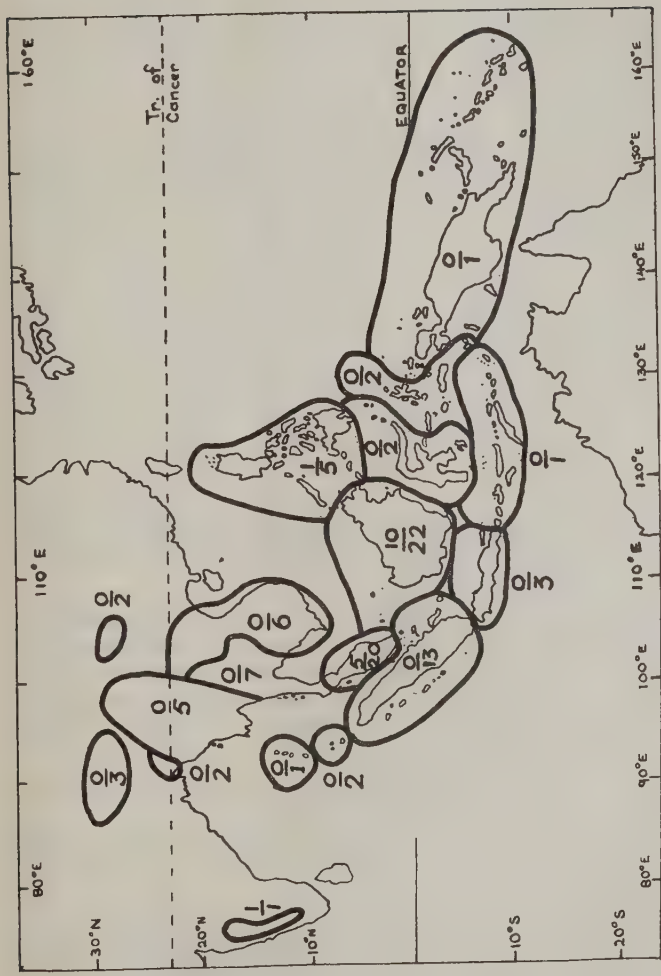
In East and North East Borneo most of the new records are due to Kostermans and Endert. Kostermans obtained *K. membranifolia* and *woodii*, while both of them at one time or another have collected *conferta, galeata* and *latifolia*.

(*f*) *South Borneo and West Borneo*

From South and South East Borneo come *K. curtisii* var. *linguiformis* and *latericia* var. *latericia* collected by Kostermans and *uliginosa* by Buwalda and Hubert Winkler. Little or nothing has come out of West Borneo since the days of Hallier, Teijsmann and Main, yet the slashing down of fresh forest continues at an alarming rate.



Map 1. Distribution of the genus *Knema*.



Map 2. Distribution of *Knema* in the separate regions. The digits above the hyphen represent endemics, those below the total number of species.

Polymorphic and Common Species

The most polymorphic species of all is *K. cinerea* and its commonest variety is var. *sumatrana*. It is a matter of regret that the name of this plant has had to be changed from the well-known *K. glaucescens* var. *glaucescens* to *cinerea* var. *sumatrana* and that the varieties likewise have to be transferred to *K. cinerea* (see note under *K. cinerea* in the Systematic Part). This species being polymorphic, has a wide and interesting distribution. It occurs as var. *andamanica* in the Andamans, Nicobars, India, Burma, Indo-China, and northern Siam, but is replaced by var. *sumatrana* in southern Siam. The latter extends through the Malay Peninsula to Borneo, Sumatra, Banka, Java but stops abruptly in Bali. From Lombok to Timor Laut, it is replaced by the var. *cinerea* which is also found in Celebes and the Moluccas. It is interesting to note that Wallace's line passes between Bali and Lombok. *K. cinerea* var. *sumatrana* is the most variable of all the varieties and perhaps I may have lumped too many forms into it such as some with narrow leaves. Perhaps *K. geminata* might have been separated from it as another variety or a form, on account of its smaller leaves and ridged fruit. I have included it in var. *sumatrana* as I have seen some specimens with a few large leaves and a greater number of small leaves on the same plant. The small leaves are in the majority, but anyhow the differences are slight. For distribution of the remaining varieties of *cinerea* see under that species in the Systematic Part.

K. laurina is another common species with a wide distribution extending from Lower Burma to the Nicobars, Indo-China, Siam, Sumatra, Malay Peninsula, Java (except East Java) and Borneo. There is some variation especially in the amount of tomentum of the leaves and in the size of the fruits but the forms grade into each other (see notes under that species).

K. curtisii is polymorphic but apart from var. *curtisii*, its other varieties have a rather limited distribution.

K. furfuracea occupies a wide range from Indo-China, to Siam, Malay Peninsula, Sumatra, Riouw Archipelago and Borneo without very much variation.

K. globularia also has a wide distribution, being one of the two species that extends as far north as China (Yunnan). It is usually a plant of rocky sea shores or small islands in Malaya and Lower Siam and is remarkably uniform without variation in spite of its range. In Indo-China and Yunnan it is found inland and these plants differ little or not at all from the Malayan, except, however,

for some specimens from the Col des Nuages near Tourane which have more coriaceous leaves and resemble *K. cinerea* var. *andamanica.*

K. latericia has a somewhat curious distribution. It is not variable in Malaya where only the typical form exists. In Borneo there is some variation where two varieties as well as the typical one are to be found. The typical variety is common in Johore, Singapore and in Borneo and extends to Palawan in the Philippines. It is also found in Banka but not yet in the mainland of Sumatra. It has been recorded from Kedah and Perak, both single records and then jumps north over a huge gap and appears again at Mt Bana in Indo-China, also known from a single record.

K. glomerata is widely spread throughout the Philippines from the islands in the extreme north to the Sulu Islands almost off the shores of British North Borneo. The supposed record from Formosa named *Myristica glomerata* (Blanco) Kudo & Masamune is *Myristica cumingii.* There is some slight variation in width of leaves, size and hairiness of the flower. Such variation is reasonable on account of the range. In Borneo *K. glomerata* is replaced by the allied species *K. korthalsii* which also occurs in the southern portion of the Philippines in Palawan and Mindanao.

Endemic Species

The rarest of all *Knema* species was *rufa,* an endemic Bornean species, recorded from a single gathering only on Matang in Sarawak by Beccari, but in August 1960, I found it in two places in Sarawak and one in Brunei. Perhaps it has been overlooked and is not quite so rare after all. This is followed by *K. muscosa* collected twice by Clemens on Mt Majau, Sarawak in the moss forest. Also rare is *K. pectinata,* first obtained from Sarawak by Beccari and again by M. Jacobs at Mt Penrissen, Wood at Sipitang in British North Borneo and by myself on Matang in Sarawak. In the Malay Peninsula, *K. retusa* is known only from Gunong Bubu in Perak. It was collected once by King's collector in May 1885 and not seen again until I collected it in October 1958 from two areas on the foot hills of G. Bubu. There were several trees seen. *K. oblongifolia* var. *oblongifolia* also seems to be somewhat rare, known only from Perak and Selangor. Its variety *monticola,* although endemic on the higher mountains in Malaya is not rare. *K. rigidifolia,* also a mountain species, is apparently rare and confined to Fraser's Hill and the Cameron Highlands in Pahang. The conclusions are that the majority of the rare species are endemics, but all endemics are not necessarily rare. Some of the common

endemics may have a very limited local distribution such as *K. kinabaluensis* on Mt Kinabalu only, while others have a fairly wide one such as *K. elmeri, membranifolia* and *plumulosa.*

Mountain species

While *Knema* and most of the Myristicaceae are trees of shady, lowland forest, there are several mountain species confined to the mossy forest from 920–1,540 m (3,000–5,000 feet). In Borneo we have as examples *K. kinabaluensis, muscosa* and *pectinata.* In Malaya the mountain species are *K. oblongifolia* var. *monticola* and *K. rigidifolia.* The mountain species have thicker leaves with distinct nerves and reticulations. The leaves of *rigidifolia* are extremely like those of *kinabaluensis,* the latter having slightly more oblique veins and are always acute at the base. Those of the former are often slightly thicker and the base sometimes rounded. In Sumatra, *K. mandaharan* ascends to 1,800 m, when it has smaller leaves and more distinct reticulations than in the typical lowland plants. Here again the leaves of such higher altitude specimens very closely resemble those of *rigidifolia.* In Malaya all records of *mandaharan* are from lowland forest.

KEYS

Three keys are given here. Key No. 1 is a scientific key showing the natural affinities of the species based on floral characters, vegetative characters being added wherever possible. The use of floral characters follows the same pattern as in the scientific key for *Knema* in my first paper with some modifications. The system is based on whether the stigma is sessile or stalked, few or many-lobed and the position of the bracteole on the pedicel. A skeleton key or outline skeleton to the system is given below. No. 2 is a general purpose key. The first part of it is based on the tomentum of the lower surface of the leaf and is entirely artificial, the remainder is also partly artificial with a good deal of stress on vegetative characters, but flowering and fruiting ones are also used as far as possible. Both keys No. 1 and 2 cover all the species in the genus. A third key for Bornean species only, is an abridged edition of the second. It is hoped that it may be of use to foresters in Borneo who may be concerned only with the species in their own area and who will not wish to wade through the longer keys. There will be less chance of their going astray in a shorter key, as *Knema* is a difficult genus with too many species which cannot in my opinion be covered by a key based on sterile characters alone.

Skeleton of system on which Key No. 2 is based

a Stigma many-lobed (anthers sessile)		**Division I**
b Bracteole median		
c Bark tending to crack	(*hookeriana, furfuracea, latericia, percoriacea* = (twigs only flaking), *elmeri* and *galeata*)	Group 1a
c Bark not tending to crack	(*pectinata, korthalsii, glomerata* and *woodii*)	Group 1b
b Bracteole at the base of the flower	(*plumulosa, intermedia, mandaharan, rufa* and *uliginosa*)	Group 2
a Stigma few-lobed		**Division II**
d Style present		Sub-division I
e Bracteole at the base of the flower		
f Anthers sessile	(*laurina, oblongifolia, globularia* and *attenuata*)	Group 3a
f Anthers stalked	(*retusa* and *ashtonii*)	Group 3b
e Bracteole median.		
(Anthers sessile)	(*linifolia*)	Group 4
(Anthers stalked)	(*no species*)	
d Style absent (bracteole median)		Sub-division II
g Anthers sessile		
h Anthers many	(*curtisii* and *membranifolia*)	Group 5
h Anthers few	(*latifolia*)	Group 6

g Anthers stalked		
i Anthers few	(*stenophylla, muscosa, tomentella, kinabaluensis, rigidifolia* and *communis*)	Group 7a
i Anthers many	(*conferta, erratica, scortechinii, kunstleri malayana* and *cinerea*	Group 7b
(bracteole at base of flower)	(*no combination and no species as yet known*)	

Most species fall into Group 7 (stigmas few-lobed, style absent, anthers stalked). It will be seen that there is no combination next to *linifolia* of "style present, bracteole median and anthers stalked". It will also be noticed in section (*d*), "style absent" that the bracteole is median and there is no sub-division "bracteole at base of flower". Again in the first section (*a*) the anthers are all sessile. Perhaps if new species are discovered in Borneo they might fall into such missing sections.

Difficulties in identifying species of Knema from the keys

In the identification of *Knema* and other *Myristicaceae*, the student will meet with four kinds of material—(1) sterile, (2) male flowers, (3) female flowers and (4) fruit. Sterile material, as already pointed out, is difficult to name, but much of it can be identified from Key No. 2. If one has already seen all the 37 species of *Knema* and knows what they look like, the task of identification of sterile material can be satisfactorily accomplished; but to a systematist who has never seen a *Knema* in his life (even if he were an adept in the use of a key), the naming of sterile material would be a formidable problem. The dioecious condition makes the identification more difficult so a place has to be found in the key for both male and female flower characters. In fact as many contrasting, diagnostic characters as possible have been crammed into the keys, since there are so many places where the student may go astray, especially if some of the important stages are missing in the material used for naming. The student will be glad to rely on all the available information the key can offer especially

when flowering and fruiting stages are missing. For this reason the keys have become lengthy and bulky. Their length is also due to the fact that more words have to be used in describing certain vegetative structures such as twigs, colour of leaves on drying or the structure of reticulations in contrast to other structures where short, concise phrases such as "pedicels 1–2 cm. long, leaves acute at the apex or leaves obtuse at the apex" can be used. Colour is best expressed by the use of the words light, medium and dark, thus:—fruit medium brown and not by fancy or vague terms such as fruit nut-brown. Extra phrases also have had to be inserted to cover aberrant specimens or variations of the phenotype. This leads us on to the mention of a fifth kind of material, one which could be of great danger to the beginner who may get side-tracked in using the key. This is material with immature flowers, fruits and leaves. The following conditions will show wherein the danger lies when an inexperienced student makes use of such material:—The flowers will be smaller and the colour of the perianth inside paler. Anthers may appear sessile when they are really stalked. They may be erect (no room for them to lie flat in the bud), later horizontal when the perianth expands, and finally decurved. The bracteole may be at base of the perianth and only later will move with the elongation of the pedicel into a ± median position, upsetting ones course in the use of the key (especially in Key No. 1). The stigma may appear sessile in the young stage and elongate later. Fruits may be tomentose when young and tomentulose to subglabrous later. Sufficient lengths of twigs should be collected to show the cracking of the bark, a character of some significance, used in the key. Even if the bark does not crack, it is often different in appearance and colour in the older portions. Apical leaves are smaller than those lower down on the twig, and may show some kind of indumentum, absent in old leaves. Some range of measurements should be given in the key to cover all these deviations, e.g. "leaves 10–20 cm. long, average 14 cm.". I have had to add other details to the keys to cover such aberrations and abnormalities, hereby further but unavoidably increasing their length.

In spite of all these difficulties in identification enumerated, *Knema* has, in some respects, advantages over *Horsfieldia* and *Myristica*. The anthers in *Knema* are well-separated from each other and can be easily counted, but this cannot be said about the condition found in the other two genera where the anthers are adnate to the column and so closely packed that it is difficult to determine their exact number. Finally the Berlin material of *Horsfieldia* and *Myristica* from New Guinea was destroyed during the

war. It contained a few types of which there appear to be no duplicates or isotypes in existence. In the case of *Knema* such a difficulty does not arise and no neotypes have had to be chosen since there is but a single species *K. tomentella* in New Guinea and the type of that species, originally from the Moluccas, is in Utrecht. It was first collected in New Guinea by Kostermans in 1948. Only one species from the Philippines, namely *K. acuminata* was destroyed at Manila and no duplicates have turned up. This species, however, seems to be identical with *glomerata* (see under that species in the Systematic Part).

The Arrangement of the Species in Groups

The relationship of certain species of *Knema* to others will be clearer after one has examined each species in turn. Some differences will be apparent early in the course of the study, and others later. Similarities have also to be carefully sought out and those who are not good at seeing them may tend to create too many species. The relation of one species to another depends chiefly on its similarities and once this is understood the similar species can be grouped. I must confess that the construction of the scientific key No. 1 taught me many things about *Knema* which I had failed to observe earlier. I was in doubt where to place *K. attenuata* and thought that it was near to *cinerea* or was even a variety of *cinerea.* When I made a key the relation was unmistakably with *globularia.* In fact it is a larger edition of *globularia* and I am surprised that I did not see the similarity earlier. Also the key showed that *K. woodii* was much closer to *glomerata* than was at first envisaged. It too, became clear that *K. mandaharan* should be placed next to *intermedia,* and *ashtonii* with *retusa.* From the scientific key (see skeleton key) seven groups became apparent. I have not given these groups any general or special name such as section, sub-section, series, etc. By comparing the groups with those on page 261 of my first paper, it will be seen that the arrangement or relationship of the species within the groups is essentially the same except that *K. retusa* has now been removed from its position of alliance with *intermedia, plumulosa* and *mandaharan* and placed in Group 3*a.* At that time no flowers of *retusa* were available to me so I could only make a guess regarding its group. In the first paper there are five groups, but two extra ones have been added for *K. linifolia* and *latifolia,* species outside Malaya which were not studied at that time.

Anther numbers in Knema

I have had to refer to anther numbers so often, both in identifying species and in constructing the keys, that it would be convenient for future use and would save time, if they were all listed together in one place and on one page. I give these now, also stating whether the anthers are sessile or stalked.

Sessile anthers

K. attenuata 9–13 (average 13); *curtisii* and vars 20–25; *elmeri* 10–12 (average 10); *erratica* 10–13 (average 13), King says stalked. Those I saw were probably young. They fit into key best as stalked; *furfuracea* 10–13; *galeata* 18–20; *globularia* 10–13; *glomerata* 8–13; (average 11); *hookeriana* 15–18–(20); *intermedia* 12–15 (average 13); *korthalsii* 13–20 (average 18), nearly sessile; *latericia* and vars 9–12, very shortly stalked but fit in key best as sessile; *latifolia* 3; *laurina* 6–11 (average 8); *linifolia* 13–18; *membranifolia* 18–23; *mandaharan* 13–17; *oblongifolia* vars *oblongifolia* and *monticola* 6–10; *pectinata* 14, sub-sessile; *percoriacea* 14–17; *plumulosa* 13–15; *rufa* 12–15, sub-sessile; *uliginosa* 12, shortly stalked or nearly sessile; *woodii* 18–23.

Stalked anthers

K. ashtonii 11–13, shortly stalked; *cinerea* var. *cinerea* 11–14 (average 13), var. *andamanica* 10–13, var. *cordata* 13, var. *patentinervia* 10–13, var. *rubens* 7–12, var. *sumatrana* 12–17 (average 14); *communis* 7–9; *conferta* 13–18; *kinabaluensis* 7–10, very shortly stalked; *kunstleri* 9–12; *malayana* 9–13; *muscosa* 6–8; *rigidifolia* 12–15 (probably stalked, I saw very young flower buds); *retusa* 15, shortly stalked; *scortechinii* 10–14; *stenophylla* 6–8; *tomentella* 6–9.

It will be seen that sessile anthers are in the majority and that the smallest number is 3 (*latifolia*) and the largest 25 (*curtisii*).

A Recent Publication

In 1959 the *Natürlichen Pflanzenfamilien* 2nd edition, vol. 17a II appeared with a treatment on *Myristicaceae* by J. C. Th. Uphof, pages 177–220. *Knema* is dealt with briefly on pages 217–220. The outstanding features and the geographical distribution of the species mentioned are given.

Scope for future work

Very little is known about the general biology, germination, growth-rate, pollination, fertilization, leaf anatomy, and chromosome numbers. Some of these problems might be tackled with some profit by honours students in Botany at Universities or by post-graduates. It would be interesting to know if a comparative study on leaf anatomy would have any bearing on systematics, and

if sterile material could thus be identified on results obtained. In *Gardens' Bulletin,* Singapore 16 (1958) 209, I listed certain Malay Peninsula species, the descriptions of which are not yet quite complete, mentioning the parts, organs or characters still needed so that future workers can look for such species and supply information on what is missing. I have indicated here similar missing characters for the Bornean species. I have to state with satisfaction that some of the missing information has now been obtained for 4 of the Malay Peninsula species mentioned in the above publication. The following list will show what has been gained.

K. cinerea var. *cordata.* Female flowers now seen. Perianth fragrant, coriaceous, rusty-tomentulose outside, cream inside, obovoid or turbinate, 5–6 mm. long; ovary chocolate-tomentose, ovoid, 2.5 mm. long, stigma sessile, bi-lobed and each lobe again divided into 3–4 lobes; pedicels 8 mm.—1 cm. long with a median bracteole. Fruit orange when ripe; seed dark brown.

K. cinerea var. *patentinervia.* Bark characters now obtained from a tree at Mawai-Kuala Sedili new road, Johore, *Sinclair 10164* (A, B, BM, E, K, L, M, NY, SAN, SING.) Bark rusty-brown, flaking in thin strips.

K. retusa. Bark, male and female flowers now seen. For description see systematic part. I went specially to the locus classicus at Gunong Bubu in October 1959 to obtain information on the above and was rewarded by finding several trees.

K. scortechinii. Female flowers now seen. Perianth coriaceous, rusty-tomentulose, oblong-obovoid, 5 mm. long; ovary sub-globose, rusty-tomentose, 3 mm. in diam.; stigma bi-lobed each lobe again bifid; pedicels 8 mm.—1.2 cm. long with a median bracteole.

Bornean Species

Parts unknown or wanted	*Name*
K. ashtonii ..	.. Female flowers imperfectly known (immature).
K. curtisii var. amoena	Female flowers and fruit unknown.
K. curtisii var. arenosa	.. Fruit unknown.
K. curtisii var. linguiformis	.. Fruit unknown.
K. korthalsii ..	.. Bark characters.
K. membranifolia ..	.. Female flowers unknown.
K. muscosa ..	.. Female flowers and bark characters unknown.
K. pectinata ..	.. Female flowers unknown.
K. rufa ..	.. Female flowers unknown.
K. uliginosa ..	.. Female flowers imperfectly known. Bark characters unknown.
K. woodii ..	.. Fruit unknown.

From this list it will be seen that female flowers in many cases are still wanted. Flowers in *Knema* and in the other genera too, are small and less conspicuous than fruit and may escape the notice of collectors. They often drop off or get knocked off from specimens in the process of drying or changing the paper in the press, so many duplicates arrive without a single flower. If some spirit is not handy at the time of collecting, then a few extra flowers should be picked off the tree and put into a paper packet to ensure no loss, even though the duplicate receives much handling.

Acknowledgements

I have to thank all the curators and keepers of herbaria for sending me specimens on loan or permitting me to work in their institutions. I have also to thank the late Dr. Chatterjee of the Calcutta Botanic Garden for allowing me to work there in October 1959 when the Department was closed for two weeks due to the annual Durga Puja holidays and am very grateful to Dr. S. K. Mukerjee, the Curator, who gave up part of his holiday to open the herbarium and be present during the week spent there. Special thanks is due to Prof. van Steenis for advice and encouragement and for sending me abstracts from books and other essential literature not available in Singapore. I am greatly indebted to Messrs. J. A. R. Anderson and B. E. Smythies of the Sarawak Forest Department and to Inche Yakin bin Long of the Brunei Forest Department for supplying transport and Dyak tree climbers during my visit to Borneo. Finally I must thank Mr. H. M. Burkill, Director, Botanic Gardens Singapore, for granting me time off from other duties to complete this revision.

KEY No. 1

(*Scientific key showing natural affinities and based mostly on floral structure*)

a. Stigma many-lobed, sessile (lobes 8–12). The stigma is really bi-lobed and each lobe again divided into 4–6 smaller lobes or serrations. (Anthers sessile, very shortly stalked in *latericia*)

b. Bracteole of pedicel ± median [All generally large-leaved plants, leaves 30 cm. or more long except *latericia, elmeri* and *glomerata*]. Flowers generally red or dark red inside

c. Bark of trunk and twigs tending to crack and flake (not always apparent unless adequate lengths of twigs are present; may not always be visible in *latericia*

because of the thin bark and slender twigs, or in *galeata* the twigs of which are not fissured in the apical parts)

d. Bark tending to crack in the apical as well as in the older parts. Leaves widest at the middle, cordate or not at the base. Male flowers not mitriform in bud. Anthers 9–18, rarely 20

e. Young petioles, tips of twigs, flowers, pedicels and fruit all densely covered with pale yellowish-brown wool, the hairs up to 5 mm. long. Anthers 15–18–(20 rarely). Male flowers 1 cm. long, male pedicels 1–2 cm. long; female flowers 1.7–2 cm. long (the largest in the genus); female pedicels 1.5–2 cm. long. Fruit ellipsoid, 4.5–8 cm. long and 3–4.5 cm. broad; stalk 1 cm. long (13) **K. hookeriana**

e. Young petioles, tips of twigs, the flowers, pedicels and fruit tomentose, not lanose, the tomentum much shorter. Leaves cordate or not at the base, Anthers 9–13. Male flowers, female flowers, pedicels, fruit and fruit-stalk all smaller

f. Leaves large (sometimes small ones at the tips of the twigs) 10–50 cm. long and 3–14 cm. broad, cordate at the base; nerves 24–35 pairs. Male flowers pale yellowish-brown outside, 6–7 mm. long; female same colour, 1 cm. long. Male pedicels 7–10 mm. long, female flowers nearly sessile, their pedicels 2 mm. long. Fruit pale yellowish-brown, sparsely tomentose, oblong, 3.5–4.5 cm. long and 2–3 cm. broad; stalk 4–5 mm. long (9) **K. furfuracea**

f. Leaves smaller, 12–32 cm. long and 3–8.5 cm. broad, (sometimes larger in *latericia* var. *lunduensis*) not cordate at the base; nerves 9–22 pairs. Male flowers reddish-brown or pale brown outside, 5–6 mm. long; female same colour, 6–9 mm. long. Male pedicels 3–4 mm. long (5–7 mm. in *elmeri*),

female 4 mm. long or flowers sessile. Fruit reddish-brown tomentose, obovoid or oblong-ellipsoid, 1.7–3.5 cm. long and 1.2–2.5 cm. broad, sessile or on a very short stalk.

g. Bark of trunk longitudinally striate. Twigs 4–6 mm. thick at the apex. Leaves rigidly coriaceous. Male flowers 5–6 mm. in diam., female 8–9 mm. long. Male pedicels 2 mm. thick and female 4 mm. thick. Tomentum of flowers with hairs 1–2 mm. long. Anthers 14–17. Fruit oblong-ellipsoid, 3 cm. long and 2 cm. broad

(28) **K. percoriacea**

g. Bark of trunk flaking irregularly, not longitudinally striate. Twigs 2–3 mm. thick at the apex (except in var. *lunduensis*). Leaves thinly coriaceous, slightly smaller (except in var. *lunduensis*). Male flowers 5 mm. in diam., female 6 mm. long. Male pedicels 1 mm. thick, female flowers sessile. Tomentum of flowers 0.5 mm. long or less (longer in var. *lunduensis*). Anthers 9–12. Fruit oblong, obovoid-ellipsoid or obovoid, 1.7–2.5 cm. long and 1.2–1.5 cm. broad (larger in var. *lunduensis*)

h. Leaves lanceolate to oblanceolate, glabrous beneath; nerves reddish-brown beneath when dry. Flowers reddish-brown-tomentose outside (pale brown in var. *albifolia*). Male pedicels 3–4 mm. long. Staminal disc flat. Fruit obovoid, rusty-tomentose

(18) **K. latericia** and its **vars.**

h. Leaves oblong or oblong-elliptic, covered with silvery or pale brown stellate scales beneath; nerves not reddish-brown beneath when dry. Flowers pale brown-tomentulose outside. Male pedicels 5–7 mm. long. Staminal disc, convex, umbrella-shaped. Fruit oblong, shortly tomentulose (7) **K. elmeri**

d. Bark tending to crack in the older portions only, consisting of a smooth, glabrous, reddish-brown portion at 3–4 cm. below the furfuraceous apex and then the older greyish-brown flaking portion. Leaves not widest at the middle, but the sides nearly parallel, not cordate at the base. Flowers mitriform in bud (this character not apparent in very young buds). Anthers 18–20 (10) **K. galeata**

c. Bark of twigs not tending to crack or flake

i. Nerves 40–52 pairs, (more numerous than in any other species of *Knema*). Sides of leaf nearly parallel. Flowers tomentulose outside. Fruit flanged along the line of suture (27) **K. pectinata**

i. Nerves 12–40 pairs. Sides of leaf nearly parallel or not. Flowers tomentulose or tomentose outside. Fruit not flanged along the line of suture (not seen in *woodii*)

j. Twigs angled and glabrous at the apex, blackish in patches, greyish lower down. Leaves often drying dark grey above, their margins nearly parallel; nerves 23–30 pairs. Flowers tomentulose outside. Staminal disc flat, triangular with 18–23 anthers (37) **K. woodii**

j. Twigs not angled at the rusty-furfuraceous apex, grey, straw-coloured or reddish-brown lower down. Leaves usually drying an olive-green above, their margins sometimes nearly parallel, but most often widest at the middle;

nerves 12–40 pairs. Flowers tomentose outside. Staminal disc convex and circular in outline with 8–18-(20) anthers

k. Leaves chartaceous, elliptic, elliptic-lanceolate or lanceolate, sometimes lobed (heterophyllous); nerves 12–20 pairs, average 16. Twigs 2 mm. thick at or near the apex. Male flowers 3–4 mm. long and 5 mm. broad in bud, 7–8 mm. across when expanded; female flowers 5 mm. long. Male pedicels 4–7 mm. long. Anthers 8–13, average 11 (12) **K. glomerata**

k. Leaves chartaceous to thinly coriaceous, oblong or oblong-obovate and narrowed to the base, not elliptic (the sides sometimes parallel), not heterophyllous; nerves 20–40 pairs. Twigs slightly thicker, 3–4 mm. thick at or near the apex. Male flowers slightly larger, 3–5 mm. long and 6–7 mm. broad, 1 cm. across when expanded; female flowers 8 mm.–1 cm. long. Male pedicels 8 mm.–1 cm. long. Anthers 13–18–(20), average 18 (16) **K. korthalsii**

b. Bracteole at base of flower [Leaves not so large as in the preceding group, 11–30 cm. long, except *mandaharan.*] [Anthers sessile, shortly stalked or sessile in *plumulosa*]. Flowers generally cream, pale yellow or pale pink inside

l. Leaves coriaceous or thinly coriaceous, 11–30 cm. long, nerves 12–22 pairs

m. Male pedicels 5 mm.–1 cm. long. Staminal disc convex or mammillate; connectives not produced beyond the apices of the anthers. Fruit covered with short tomentum, hairs 0.5–1 mm. long (except in *plumulosa*)

n. Petioles of young leaves, apices of twigs and also the flowers, pedicels and fruit covered with dark, rusty wool, the hairs 2 mm. long. Male flowers 6–7 mm. long; female 1 cm. long, female pedicels 3–4 mm. long and 4–5 mm. thick. Perianth persistent in fruit (29) **K. plumulosa**

n. Petioles of young leaves, apices of twigs and also the flowers, pedicels and fruit covered with very short, rusty scurf, not lanose. Male flowers 4–6 mm. long; female 7–8 mm. long, female pedicels 7–8 mm. long (3–4 mm. in *uliginosa*). Perianth not persistent in fruit

o. Twigs mostly reddish-brown, greyish in the older parts. Reticulations of leaves close and distinct above (faint or distinct in *mandaharan*). Flower buds not depressed in the centre when dry. Male pedicels 5 mm.–1 cm. long. Fruit ellipsoid or oblong, 3–4.5 cm. long and 1.8–3.5 cm. broad, tomentose or covered with stellate scurf which rubs off, stalk 5 mm.–1.2 cm. long

p. Leaves coriaceous, 11–22–(30) cm. long, acute or rounded at the base; nerves 12–22 pairs. Twigs 2–3 mm. thick at the apex. Male pedicels 7–8 mm. long. Staminal disc mammillate. Fruit ellipsoid, covered with short rusty-stellate scurf, 3–4 cm. long and 1.8–2.2 cm. broad; stalk 8 mm.–1.2 cm. long and 2–3 mm. thick

(14) **K. intermedia**

p. Leaves rigidly coriaceous, 17–30 cm. long in young apical leaves or in some specimens from higher altitudes (normal or mature leaves 30–60 cm. long), rounded at the base; nerves 22–26 pairs. Twigs 5 mm. thick at the apex. Male pedicels 4 mm. long (probably slightly immature). Staminal disc flat or slightly convex. Fruit oblong, larger, 3–4.5 cm. long and 3–3.5 cm. broad, and more densely tomentose with hairs up to 1 mm. long; stalk 5–7 mm. long, stout, 5 mm. thick

(23) **K. mandaharan**

o. Twigs reddish-brown at the extreme apex only, pale greyish lower down in the younger and older parts. Reticulations of leaves less dense or distinct above. Flower buds often depressed in the centre when dry. Male pedicels 5–6 mm. long. Fruit subglobose or slightly obovoid, rusty-tomentose, 1.8 cm. long and 1.5 cm. broad; stalk 4 mm. long (36) **K. uliginosa**

m. Male pedicels 1.5–2 cm. long. Staminal disc flat or concave; connectives produced beyond the apices of the anthers on dehiscing. Fruit sparsely covered with 3 mm. long, shining, rusty-brown hairs (31) **K. rufa**

l. Leaves rigidly coriaceous, 30–60 cm. long (young ones at the tips of twigs often smaller, 17–30 cm. long); nerves 22–26 pairs (23) **K. mandaharan**

a. Stigma few-lobed (lobes 2–6). The stigma is bi-lobed and each lobe again divided into 2–3 lobes or serrations

q. Style present, length 1.5–2 mm. long

r. Bracteole at the base of the flower. Anthers stalked or sessile. Male pedicels 3–7 mm. long and 1–1.8 cm. long in *retusa* and *ashtonii*. Fruit-stalk 5 mm.–1 cm. long except in *laurina* which is sessile or 2–3 mm. long

s. Anthers sessile. Leaves not covered with cinnamon or whitish scales beneath

t. Leaves covered with stellate hairs beneath; veins sunk above, best seen near the base (20) **K. laurina**

t. Leaves glabrous beneath; veins raised above

u. Leaves drying green or brown, 15–43 cm. long and 4–16 cm. broad, oblong, oblanceolate or (narrowly oblong to lanceolate in *oblongifolia* var. *monticola*), base rounded or cordate, acute or less often rounded in var. *monticola;* nerves 18–30 pairs; midrib usually not

striate beneath; reticulations scalariform. Twigs angled and furfuraceous at the apex, smooth and reddish-brown lower down. Anthers 6–8. Fruit obovoid, 2–2.3 cm. long and 1.5–2 cm. broad; stalk 5 mm. long

v. Leaves chartaceous, oblong, oblong-lanceolate or oblanceolate, 20–43 cm. long, average 33 cm. and 9–16 cm. broad, average 11 cm., base rounded or cordate; nerves about 30 pairs. Male pedicels 6–8 mm. long

(26) **K. oblongifolia** var. **oblongifolia**

v. Leaves coriaceous (mountain plants), lanceolate, shorter and narrower, 15–25 cm. long and 4–7 cm. broad; base acute or less often rounded; nerves 18–25 pairs. Male pedicels absent or very short, 1 mm. long

(26) **K. oblongifolia** var. **monticola**

u. Leaves drying an olive-green above, sometimes with a blackish or dark green metallic lustre, generally smaller and narrower than in var. *oblongifolia,* yet broad in some specimens of *attenuata,* 8–32 cm. long and 1.5–11 cm. broad, base mostly acute, less often rounded; nerves 12–20 pairs; midrib striate beneath when dry; reticulations fine and close. Twigs not usually angled at the furfuraceous apex, dark brown or blackish and finely striate lower down. Anthers 9–13. Fruit not obovoid, but sub-globose, oblong or ellipsoid, 1.5–3 cm. long and 1.3–1.6 cm. broad; stalk 5 mm.–1 cm. long

w. Leaves chartaceous, seldom coriaceous except in some mountain forms from Indo-China, lanceolate to oblong-lanceolate, 8–17 cm.

long and 1.5–5 cm. broad; reticulations fine on both surfaces; petiole 8 mm.–1 cm. long. Male flowers 3 mm. long in bud, rusty-tomentose. Fruit sub-globose, 1.5–2 cm. long and 1.3–1.5 cm. broad (11) **K. globularia**

w. Leaves chartaceous, elliptic-oblong or elliptic-lanceolate, 13–32 cm. long (average 18 cm) and 4.5–11 cm. broad (average 6 cm.); reticulations slightly more distinct especially above; petiole 1–1.5 cm. long. Male flowers 4–5 mm. long in bud, rusty-lanose (hairs longer, about 0.5 mm. long). Fruit oblong or ellipsoid, 3 cm. long and 1.6 cm. broad (2) **K. attenuata**

s. Anthers stalked. Leaves covered with cinnamon or whitish scales beneath (scales tending to disappear in *ashtonii* on drying)

x. Twigs not angled at the apex, coarsely striate lower down. Leaves 35–60 cm. long, obtuse or retuse at the apex, scales on lower surface persisting; nerves 16–24 pairs, well-spaced, 2–4 cm. apart. Staminal disc concave or flat. Fruit ovoid, 5–6 cm. long and 5 cm. broad, slightly beaked at the apex (30) **K. retusa**

x. Twigs angled at the apex, scarcely or not striate lower down. Leaves 30–42 cm. long, scales shed later and surface white and very closely reticulate beneath; nerves 22–35 pairs, closer together, 1–1.5 cm. apart. Staminal disc convex. Fruit obovoid, 5–7 cm. long and 3 cm. broad, obtuse at the apex (1) **K. ashtonii**

r. Bracteole median. Anthers sessile. Male pedicels 1.2–1.5 cm. long. Fruit sessile or stalk very short, 2–3 mm. long. (A Himalayan species with lanceolate or oblong-lanceolate leaves, 15–40 cm. long) (21) **K. linifolia**

q. Style absent, stigmas sessile. (Bracteole median)

y. Anthers sessile. Twigs glabrous

z. Anthers many, 17–25. Twigs usually pale straw-coloured or at least in parts, smooth, not striate (occasionally a few faint striations may be present in the older parts). Leaves drying an olive or yellowish-green above

aa. Leaves often elliptic or widest at the middle (spathulate, lanceolate, obovate or linguiform in some of the varieties) length up to 14.5 cm. (small leaves in var. *arenosa* and var. *paludosa*); petiole up to 1.2 cm. long. Bark of twigs not flaking. Perianth puberulous outside. Staminal disc triangular with the anthers touching each other laterally. Fruit ellipsoid; stalk 1–1.3 cm. long
(6) **K. curtisii** and its vars

aa. Leaves oblong-lanceolate, not elliptic nor widest at the middle, length 12–25 cm.; petiole 1.5–2.5 cm. long. Bark of twigs occasionally flaking in the oldest parts. Perianth nearly glabrous outside. Staminal disc circular with well-spaced anthers. Fruit obovoid, sessile or almost sessile, stalk when present 3–5 mm. long
(24) **K. membranifolia**

z. Anthers few, 3 only, 1 at each angle of the triangular staminal disc. Twigs brown, not pale straw-coloured, smooth at the apex but striate lower down. Leaves drying dark brown or blackish above with a metallic lustre (19) **K. latifolia**

y. Anthers stalked. Twigs usually rusty-tomentulose at the apex

bb. Anthers few, 6–10 (12–15 in *rigidifolia*). Male pedicels very short, 2–5 mm. long

cc. Leaves 1–4 cm. broad, reticulations invisible or distinct above. Fruit 1.8 cm. long and 1 cm. broad

dd. Reticulations invisible or very faint above. Flowers rusty-tomentulose.

Male flowers 2–2.5 mm. long. Male pedicels 4–5 mm. long. Female flowers 2–2.5 mm. long. Female pedicels 3 mm. long (34) **K. stenophylla**

dd. Reticulations distinct above and below forming a close, dense network. Flowers rusty-tomentose with stellate and dendroid hairs. Male flowers 4 mm. long. Male pedicels 2–3 mm. long. Female not seen (25) **K. muscosa**

cc. Leaves 2.5–8.5 cm. broad; reticulations distinct. Fruit 1.8–4 cm. long and 1–2.5 cm. broad, obovoid, oblong or sub-globose

ee. Twigs coarsely striate. Leaves drying a medium brown above, nerves oblique, very prominent above as are the reticulations; lower surface not covered with rusty-stellate scales when young. Fruit-stalk 3–8 mm. long or fruit sessile

ff. Leaves coriaceous. Anthers 6–10. Fruit oblong or obovoid; stalk 5 mm.–1 cm. long

gg. Leaves glabrous beneath; nerves very oblique. Male flowers tomentulose. Fruit oblong, tomentulose, strongly ridged along the line of suture, 3.5–4 cm. long and 2.5 cm. broad (15) **K. kinabaluensis**

gg. Leaves glabrous beneath or when young covered with rusty-stellate hairs (not scales) on the midrib and nerves; nerves slightly less oblique. Male flowers densely tomentose with stellate and dendroid hairs. Fruit obovoid, tomentose, not ridged along the line of suture, 2–2.5 cm. long and 1.8 cm. in diam (35) **K. tomentella**

ff. Leaves rigidly coriaceous. Anthers 12–15. Fruit sub-globose, 3 cm. in diam. (not ridged along line of suture), sessile or with a 3 mm. long stalk (31) **K. rigidifolia**

ee. Twigs finely striate. Leaves drying a dark brown above or sometimes dark green; nerves less oblique and less prominent; reticulations less prominent; lower surface covered with rusty scales when young. Fruit obovoid; stalk 1–1.5 cm. long (4) **K. communis**

bb. Anthers more numerous, 9–18, average number about 13. Male pedicels longer, 6 mm.–1.5 cm. long, (3–4 mm. in *cinerea* var. *rubens*)

hh. Leaves covered with some kind of tomentum beneath, persisting or not

ii. Leaves with stellate hairs beneath, the tomentum persisting or disappearing except on the lower midrib

jj. Leaves coriaceous, base rounded or cordate, sides not always parallel, sometimes widest at the middle; reticulations very prominent; tomentum persisting. Male flowers in dense clusters. Male pedicels 7 mm.–1 cm. long. Anthers 13–18. Fruit ovoid, tomentulose, 3.5–4 cm. long and 2–2.5 cm. broad (5) **K. conferta**

jj. Leaves thinly coriaceous, base acute or rounded, not cordate, sides nearly parallel; reticulations less prominent; tomentum persisting altogether or remaining on the lower midrib only. Male flowers 1–4 in a cluster. Male pedicels 7 mm. long. Anthers 10–13, average 13. Fruit ellipsoid, tomentose when young, the tomentum shedding later, 2.5 cm. long and 2 cm. broad (8) **K. erratica**

ii. Leaves covered with rusty scales when young only (33) **K. scortechinii**

hh. Leaves glabrous beneath

kk. Twigs striate right up to the apex except in *scortechinii*. Leaves elliptic or lanceolate

ll. Leaves coriaceous, 18–28 cm. long, lanceolate, drying dark brown above; nerves 18–28 pairs; reticulations forming a dense network, prominent above and below. Male pedicels 1–1.2 cm. long. Anthers 10–14. Fruit ovoid-globose, 2.5–3 cm. long and 2–2.3 cm. broad (33) **K. scortechinii**

ll. Leaves rigidly coriaceous, 9–19 cm. long, elliptic, drying greenish or yellowish-green above; nerves 7–14 pairs except in var. *surigaoensis;* reticulations forming a dense network, very prominent above and below. Male pedicels 7 mm.–1 cm. long. Anthers 9–14. Fruit ellipsoid to sub-globose, 2–2.5 cm. long and 1.5 cm. broad (17) **K. kunstleri** and its **vars**

kk. Twigs not striate right up to the apex. Leaves lanceolate, oblong-lanceolate or oblong

mm. Twigs reddish brown. Leaves membranous, greenish-brown with a blackish tinge above when dry; reticulations fine but distinct on both surfaces, forming a close network. Male pedicels 1–1.5 cm. long. Staminal disc flat. Fruit obovoid, 1.5 cm. long and 1–1.2 cm. broad; stalk slender, 5 mm. long (22) **K. malayana**

mm. Twigs greyish or greyish with black patches here and there (some brownish-black patches in var. *cordata*). Leaves mostly coriaceous or thinly coriaceous, brownish or greenish above when dry; reticulations fainter or sometimes scarcely visible above, but quite distinct in var. *andamanica* and var. *cordata*. Male pedicels shorter, usually 5 mm.–1 cm. long (3–4 mm. long in var. *rubens*). Staminal disc slightly convex. Fruit mostly oblong but also sub-globose (see under vars for shapes and sizes)
(3) **K. cinerea** and its **vars**

KEY No. 2

a Leaves covered with cinnamon or whitish scales beneath, especially when young, scales persisting in *K. elmeri* and *retusa*, but tending to disappear in *ashtonii* on drying

b. Lamina 30–60 cm. long. Male pedicels 1–1.8 cm. long with the bracteole at the apex. Anthers shortly stalked. Fruit large, 5–7 cm. long and 3–5 cm. broad

c. Twigs not angled at the apex, coarsely striate lower down. Leaves obtuse or retuse at the apex; nerves 16–24 pairs, well-spaced, 2–4 cm. apart. Staminal disc concave or flat. Fruit slightly beaked at the apex
(30) **K. retusa**

c. Twigs angled at the apex, scarcely or not striate lower down. Leaves rounded and then apiculate at the apex, rarely obtuse; nerves 22–35 pairs, closer together, 1–1.5 cm. apart. Staminal disc convex. Fruit obtuse at the apex (1) **K. ashtonii**

b. Lamina 12–22–(30) cm. long. Male pedicels 4 mm.–1.2 cm. long with a ± median bracteole. Anthers sessile or stalked. Fruit smaller, 2.5–3 cm. long and 2–2.5 cm. broad

d. Twigs angled, their bark pale greyish-brown, tending to crack or flake. Leaves drying a medium brown above, sometimes with a greenish tinge; indumentum

of lower surface persisting. Anthers 10–12, sessile; disc convex. Female flowers sessile, both sexes pale brown outside, scarlet inside. Fruit stalk 2–5 mm. long

(7) **K. elmeri**

d. Twigs terete, their bark reddish-brown or dark greyish, finely striate, and not tending to crack. Leaves drying a darker brown, blackish-brown or greenish-brown above; indumentum of lower surface not persisting. Anthers 7–14, stalked; disc flat. Female flowers on a 5 mm. long pedicel, both sexes reddish-brown outside, cream-coloured or pink inside. Fruit stalk 1–1.5 cm. long

e. Leaves 16–30 cm. long (average 20 cm.) and 4.5–6 cm. broad. Male flowers cream-coloured inside, 5 mm. in diam.; pedicels 1–1.2 cm. long. Anthers 10–14. Fruit ovoid-globose, 2.5–3 cm. long and 2–2.3 cm. broad (33) **K. scortechinii**

e. Leaves similar in texture but smaller, 6–25 cm. long and 2.5–7 cm. broad. Male flowers pink inside, 2–3 mm. in diam.; pedicels 4–5 mm. long. Anthers 7–9. Fruit obovoid, smaller, 1.8 cm. long and 1–1.3 cm. broad

(4) **K. communis**

a. Leaves not covered with cinnamon or whitish scales beneath, glaucous or brownish beneath when dry

f. Leaves pubescent or thinly tomentose beneath with stellate hairs

g. Twigs usually striate in the apical parts. Veins of leaf raised above. Male pedicels 7 mm.–1 cm. long (except in *tomentella*) with a median bracteole. Female pedicels 5 mm. long. Anthers stalked (sessile in *erratica*) 13–18. Fruit-stalk 5 mm.–1 cm. long

h. Pubescence of leaves persisting. Leaves sometimes slightly cordate at the base. Male flowers very numerous in the cluster. Fruit tomentulose or shortly tomentose, 3.5–4 cm. long and 2–2.5 cm. broad (5) **K. conferta**

h. Pubescence of leaves not persisting except on midrib and nerves, becoming quite glabrous in *tomentella*. Leaves not cordate at the base. Male flowers 1–4 in a cluster. Fruit tomentose, slightly smaller, 2–2.5 cm. long and 1.8–2 cm. broad

i. Leaves coriaceous, sides not parallel. Male and female pedicels 3 mm. long. Anthers 6–9, stalked. Fruit obovoid, tomentum persisting, hairs less than 1 mm. long
(35) **K. tomentella**

i. Leaves thinly coriaceous, sides nearly parallel. Male pedicels 7 mm. long. Anthers 10–13, average 13, sessile. Fruit ellipsoid, tomentum shed later, hairs 1 mm. long
(8) **K. erratica**

g. Twigs not striate in the apical parts. Veins of leaf sunk above (especially at base of leaf). Male pedicels 3–5 mm. long with bracteole at base of perianth. Female flowers sessile. Anthers 7–8 (11 rarely). Fruit-stalk 2–5 mm. long (20) **K. laurina**

f. Leaves glabrous beneath

j. Stigma 8–12-lobed, style absent or very short

k. Bracteole of pedicels ± median. Nerves numerous, 20–52 pairs (except in *latericia* and *glomerata*. All large-leaved species, i.e. over 30 cm. and up to 65 cm. long except in *latericia* and *glomerata*). Flowers mostly red or pink inside

l. Bark of trunk and twigs tending to crack and flake (not always apparent unless adequate lengths of twigs are present; may not always be visible in *latericia* because of its thin bark and slender twigs)

m. Leaves widest at the middle, cordate or not at the base. Bark tending to crack in the apical as well as in the older parts. Male flowers not mitriform in bud. Anthers 9–18, rarely 20

n. Young petioles, tips of twigs, flowers, pedicels and fruit all densely covered with pale yellowish-brown wool, the hairs up to 5 mm. long. Anthers 15–18–(20 rarely). Male flowers 1 cm. long, male pedicels 1–2 cm. long; female flowers 1.7–2 cm. long (the largest in the genus), female pedicels 1.5–2 cm. long. Fruit ellipsoid, 4.5–8 cm. long and 3–4.5 cm. broad; stalk 1 cm. long
(13) **K. hookeriana**

n. Young petioles, tips of twigs, the flowers, pedicels and fruit tomentose, not lanose, the tomentum much shorter. Leaves cordate or not at the base. Anthers 9–13. Male and female flowers, pedicels, fruit and fruit-stalk all smaller

o. Leaves large (sometimes small ones at the tips of the twigs), 10–50 cm. long and 3–14 cm. broad, cordate at the base; nerves 24–35 pairs. Male flowers pale yellowish-brown outside, 6–7 mm. long; female same colour, 1 cm. long. Male pedicels 7–10 mm. long, female flowers nearly sessile, their pedicels 2 mm. long. Fruit pale yellowish-brown, sparsely tomentose, oblong, 3.5–4.5 cm. long and 2–3 cm. broad; stalk 4–5 mm. long
(9) **K. furfuracea**

o. Leaves smaller, 12–32 cm. long and 3–7 cm. broad, (sometimes larger in *latericia* var. *lunduensis*) not cordate at the base; nerves 9–22 pairs. Male flowers reddish brown outside (pale brown in *latericia* var.

albifolia) 5–6 mm. long; female same colour, 6–9 mm. long. Male pedicels 3–4 mm. long, female 4 mm. long or sessile. Fruit reddish-brown, tomentose, obovoid or oblong-ellipsoid, 1.7–3.5 cm. long and 1.5–2.5 cm. broad, sessile

p. Bark of trunk longitudinally striate. Twigs 4–6 mm. thick at the apex. Leaves rigidly coriaceous. Male flowers 5–6 mm. in diam.; female 8–9 mm. long. Male pedicels 2 mm. thick and female 4 mm. thick. Tomentum of flowers with hairs 1–2 mm. long. Anthers 14–17. Fruit oblong-ellipsoid, 3 cm. long and 2 cm. broad
(28) **K. percoriacea**

p. Bark of trunk flaking irregularly, not longitudinally striate. Twigs 2–3 mm. thick at the apex (except in var. *lunduensis*). Leaves thinly coriaceous, slightly smaller (except in var. *lunduensis*). Male flowers 5 mm. in diam., female 6 mm. long. Male pedicels 1 mm. thick, female flowers sessile. Tomentum of flowers 0.5 mm. long or less (longer in var. *lunduensis*). Anthers 9–12. Fruit obovoid, 1.7 cm. long and 1.5 cm. broad (larger in var. *lunduensis*)
(18) **K. latericia** and its **vars**

m. **Leaves** not widest at the middle, but the sides nearly parallel, not cordate at the base. Bark tending to crack in the older portions only, consisting of a smooth, reddish-brown portion at 3–4 cm. below the furfuraceous apex and then the older greyish-brown flaking portion. Flowers mitriform in bud (this character not apparent in very young buds). **Anthers** 18–20 (10) **K. galeata**

l. Bark of twigs not tending to crack or flake

q. Nerves 40–52 pairs, (more numerous than in any other species of *Knema*). Sides of leaf nearly parallel. Flowers tomentulose outside. Fruit flanged along the line of suture (27) **K. pectinata**

q. Nerves 12–40 pairs. Sides of leaf nearly parallel or not. Flowers tomentulose or tomentose outside. Fruit not flanged along the line of suture (not seen in *woodii*)

r. Twigs angled and glabrous at the apex, blackish in patches, greyish lower down. Leaves often drying dark grey above, their margins nearly parallel; nerves 23–30 pairs. Flowers tomentulose outside. Staminal disc flat, triangular with 18–23 anthers (37) **K. woodii**

r. Twigs not angled at the rusty-furfuraceous apex, grey, straw-coloured or reddish-brown lower down. Leaves usually drying an olive-green above, their margins sometimes nearly parallel, but most often widest at the middle; nerves 12–40 pairs. Flowers tomentose outside. Staminal disc convex and circular in outline with 8–18–(20) anthers

s. Leaves chartaceous to thinly liptic-lanceolate or lanceolate, sometimes lobed (heterophyllous); nerves 12–20 pairs, average 16. Twigs 2 mm. thick at or near the apex. Male flowers 3–4 mm. long and 5 mm. broad in bud, 7–8 mm. across when expanded; female flowers 5 mm. long. Male pedicels 4–7 mm. long. Anthers 8–13, average 11

(12) **K. glomerata**

s. Leaves chartaceous to thinly coriaceous, oblong or oblong-obovate and narrowed to the base, not elliptic (the sides sometimes parallel) not heterophyllous; nerves 20–40 pairs. Twigs slightly thicker, 3–4 mm. thick at or near the apex. Male flowers slightly larger, 3–5 mm. long and 6–7 mm. broad, 1 cm. across when expanded; female flowers 8 mm. –1 cm. long. Male pedicels 8 mm.–1 cm. long. Anthers 13–18–(20) average 18

(16) **K. korthalsii**

k. Bracteole at base of the perianth. Anthers sessile, shortly stalked or sessile in *plumulosa.* (Leaves not so large as in the preceding group, 11–30 cm. long except in *mandaharan*). Flowers mostly cream-coloured inside

t. Leaves coriaceous or thinly coriaceous, 11–30 cm. long, nerves 12–22 pairs

u. Male pedicels 5 mm.–1 cm. long. Staminal disc convex or mammillate; connectives not produced beyond the apices of the anthers. Fruit covered with short, dense tomentum or scurf, 0.5 –1 mm. long except in *plumulosa*

v. Petioles of young leaves, apices of twigs and also flowers, pedicels and fruit covered with dark rusty wool, the hairs 2 mm. long. Male flowers 6–7 mm. long; female 1 cm. long, female pedicels 3–4 mm. long and 4–5 mm. thick. Perianth persistent in fruit (29) **K. plumulosa**

v. Petioles of young leaves, apices of twigs and also flowers, pedicels and fruit covered with very short, rusty-stellate scurf, not lanose. Male flowers 4–6 mm. long; female 7–8 mm. long, female pedicels 7–8 mm. long (3–4 mm. in *uliginosa*). Perianth not persistent in fruit

w. Twigs mostly reddish brown, greyish in the older parts. Reticulations of leaves close and distinct above (faint or distinct above in *mandaharan*). Flower buds not depressed in the centre when dry. Male pedicels 5 mm.–1 cm. long. Fruit ellipsoid or oblong, tomentose or covered with stellate scurf which rubs off, 3–4.5 cm. long and 1.8–3.5 cm. broad; stalk 5 mm.–1.2 cm. long

x. Leaves coriaceous, 11–22 –(30) cm. long, acute or rounded at the base; nerves 12–22 pairs. Twigs 2–3 mm. thick at apex. Male pedicels 7–8 mm. long. Staminal disc mammillate. Fruit ellipsoid, 3–4 cm. long and 1.8–2.2 cm. broad,

covered with short rusty-stellate scurf; stalk 8 mm.–1.2 cm. long and 2–3 mm. thick
(14) **K. intermedia**

x. Leaves rigidly coriaceous, 17–30 cm. long in young apical leaves only or in some specimens from higher altitudes (normal or mature leaves 30–60 cm. long), rounded at the base; nerves 22–26 pairs. Twigs 5 mm. thick at the apex. Male pedicels 4 mm. long (probably slightly immature). Staminal disc flat or slightly convex. Fruit oblong, larger and more densely tomentose with hairs up to 1 mm. long, 3–4.5 cm. long and 3–3.5 cm. broad; stalk 5–7 mm. long, stout, 5 mm. thick
(23) K. mandaharan

w. Twigs reddish-brown at the extreme apex only, pale greyish lower down in the younger and older parts. Reticulations of leaves less dense or less distinct above. Flower buds often depressed in the centre when dry. Male pedicels 5–6 mm. long. Fruit sub-globose or slightly obovoid, rusty-tomentose, 1.8 cm. long and 1.5 cm. broad; stalk 4 mm. long (36) **K. uliginosa**

u. Male pedicels 1.5–2 cm. long. Staminal disc flat or concave; connectives produced beyond the apices of the anthers.

when dehiscing. Fruit sparsely covered with 3 mm. long, shining, rusty-brown hairs (32) **K. rufa**

t. Leaves rigidly coriaceous, 30–60 cm. long (young ones at the tips of twigs often smaller, 17–30 cm. long); nerves 22–26 pairs (23) **K. mandaharan**

j. Stigma few-lobed, usually bifid and each lobe again divided into 2–3 lobes or serrations

y. Style present (length 1.5–2 mm. long). Anthers sessile

z. Bracteole median, sometimes below the middle or near base of pedicel. Leaves large, 15–40 cm. long with 25–35 pairs of nerves. Twigs 5 mm. or more thick at the apex. Male flowers 7 mm.–1 cm. long. Male pedicels 1.2–1.5 cm. long. Anthers 13–18. Fruit ellipsoid or ovoid, mostly tomentose, sometimes tomentulose. (A Himalayan species) (21) **K. linifolia**

z. Bracteole at the base of the perianth, less often above the middle. Leaves smaller (medium sized) with fewer veins except in *oblongifolia* var. *oblongifolia*. Twigs 2–3–(5) mm. thick at the apex. Male flowers 3–8 mm. long. Male pedicels 1–8 mm. long. Anthers 6–13. Fruit variously shaped, tomentulose

aa. Leaves 15–43 cm. long and 4–16 cm. broad, oblong, oblanceolate or (narrowly oblong to lanceolate in *oblongifolia* var. *monticola*), base rounded or cordate, but acute or less often rounded in var. *monticola;* nerves 18–30 pairs; midrib usually not striate beneath; reticulations scalariform. Twigs angled and furfuraceous at the apex, smooth and reddish-brown lower down. Anthers 6–8. Fruit obovoid, 2–2.3 cm. long and 1.5–2 cm. broad; stalk 5 mm. long

bb. Leaves chartaceous, oblong, oblong-lanceolate or oblanceolate, 20–43 cm. long, average 33 cm. and 9–16 cm. broad, average 11 cm., base rounded or cordate; nerves about 30 pairs. Male pedicels 6–8 mm. long (26) **K. oblongifolia** var. **oblongifolia**

bb. Leaves coriaceous (mountain plants), lanceolate, shorter and narrower, 15–25

cm. long and 4–7 cm. broad, base acute or less often rounded; nerves 18–25 pairs. Male pedicels absent or very short, 1 mm. long (26) **K. oblongifolia** var. **monticola**

aa. Leaves generally smaller and narrower than in var. *oblongifolia* yet broad in some specimens of *attenuata,* 8–32 cm. long and 1.5–11 cm. broad, base mostly acute, less often rounded; nerves 12–20 pairs; midrib striate beneath when dry; reticulations fine and close. Twigs not usually angled at the furfuraceous apex, dark brown or blackish and finely striate lower down. Anthers 9–13 except in small forms of *laurina,* Fruit not obovoid but sub-globose, oblong or ellipsoid, 1.5–3 cm. long and 1.3–1.6 cm. broad; stalk 5 mm.–1 cm. long

cc. Anthers 6–8–(11); stalk of staminal disc 1.8–2 mm. long. Leaves chartaceous to slightly coriaceous, drying pale brown above; petiole 6 mm.–1 cm. long and 2 mm. thick. [Covering small, nearly glabrous forms of *laurina* including *tridactyla*] (20) **K. laurina**

cc. Anthers 9–13; stalk of staminal disc 0.5 mm. long. Leaves chartaceous, seldom coriaceous except in some mountain forms of *globularia* from Indo-China, drying an olive-green above, sometimes with a blackish or dark green metallic lustre; petiole 8 mm.–1.5 cm. long, more slender, 1.5 mm. thick

dd. Leaves lanceolate to oblong-lanceolate, 8–17 cm. long and 1.5–5 cm. broad; reticulations fine on both surfaces; petiole 8 mm.–1 cm. long. Male flowers 3 mm. long in bud, rusty-tomentose. Fruit sub-globose, 1.5–2 cm. long and 1.3–1.5 cm. broad (11) **K. globularia**

dd. Leaves elliptic-oblong or elliptic lanceolate, 13–32 cm. long (average 18 cm.) and 4.5–11 cm. broad (average 6

cm.); reticulations slightly more distinct, especially above; petiole 1–1.5 cm. long. Male flowers 4–5 mm. long in bud, rusty-lanose (hairs longer, about 0.5 mm. long). Fruit oblong or ellipsoid, 3 cm. long and 1.6 cm. broad (2) **K. attenuata**

y. Style absent or extremely short. [Bracteole usually ± median on the pedicel but in some varieties of *cinerea*, especially in young or immature flowers, the bracteoles are above the middle or even at the base of the flower. As the pedicel grows longer, then bracteole will probably be ± median]. Anthers sessile or stalked (generally stalked but sessile in the members of groups 5 and 6)

ee. Twigs glabrous, usually pale straw-coloured, or at least in parts, smooth, not striate (occasionally a few faint striations may be present in the older parts). Leaves drying an olive or yellowish-green above. Anthers sessile, numerous, 17–25. Fruit becoming glabrous

ff. Leaves often elliptic or widest at the middle (except in some of the vars where they are spathulate, lanceolate, obovate or linguiform) length up to 14.5 cm. (small leaves in var. *arenosa* and *paludosa*); petiole up to 1.2 cm. long. Bark of twigs not flaking. Perianth puberulous outside. Staminal disc triangular with the anthers touching each other laterally. Fruit ellipsoid; stalk 1–1.3 cm. long (6) **K. curtisii** and its **vars**

ff. Leaves oblong-lanceolate, not elliptic nor widest at the middle, length 12–25 cm.; petiole 1.5–2.5 cm. long. Bark of twigs occasionally flaking in the oldest parts. Perianth nearly glabrous outside. Staminal disc circular with well-spaced anthers. Fruit obovoid, sessile or almost sessile; stalk when present 3–5 mm. long (24) **K. membranifolia**

ee. Twigs glabrous or tomentulose at the apex, not pale straw-coloured, but reddish-brown, greyish or dark brown, striate or striate at least in the older parts. Leaves drying greenish, brownish or blackish above.

Anthers usually stalked but sessile in *latifolia*, less than 18. Fruit becoming glabrous or not

gg. Leaves drying blackish or dark brown above with a metallic lustre. Anthers 3 only, one at each angle of the triangular staminal disc. Fruit rusty-tomentulose becoming glabrous, sometimes ridged or flanged along the line of suture
(19) **K. latifolia**

gg. Leaves not drying blackish above. Anthers more than 3. Fruit glabrous or not, ridged or not

hh. Male pedicels very short, 2–5 mm. long; female 1.5 mm. long or flowers sessile. Anthers 6–10 (12–15 in *rigidifolia*) shortly stalked. Fruit oblong or obovoid

ii. Leaves 1–4 cm. broad; reticulations invisible or distinct above. Fruit 1.8 cm. long and 1 cm. broad, obovoid

jj. Reticulations invisible or very faint above. Flowers rusty-tomentulose. Male flowers 2–2.5 mm. long. Male pedicels 4–5 mm. long. Female flowers 2–2.5 mm. long. Female pedicels 3 mm. long
(34) **K. stenophylla**

jj. Reticulations distinct above and below, forming a close, dense network. Flowers rusty-tomentose with stellate and dendroid hairs. Male flowers 4 mm. long. Male pedicels 2–3 mm. long. Female flowers not seen
(25) **K. muscosa**

ii. Leaves 2.5–8.5 cm. broad; reticulations distinct. Fruit 1.8–4 cm. long and 1–2.5 cm. broad, obovoid, oblong or sub-globose

kk. Twigs coarsely striate. Leaves drying a medium brown above, nerves oblique, very prominent above as are the reticulations, lower surface not covered with rusty-stellate

scales when young. Fruit stalk 3–8 mm. long or fruit sessile

ll. Leaves lanceolate, oblong-lanceolate or obovate, covered with stellate hairs on the mid-rib and nerves beneath when young, later glabrous. Flowers densely rusty-tomentose with stellate and dendroid hairs. Fruit obovoid, tomentose, not ridged nor flanged along the line of suture, stalked
(35) **K. tomentella**

ll. Leaves lanceolate or oblong-lanceolate (never obovate), glabrous beneath. Flowers tomentulose. Fruit not obovoid, tomentulose, ridged or not ridged along the line of suture, stalked or sessile

mm. Leaves coriaceous; nerves 16–20 pairs, oblique. Anthers 7–10. Fruit oblong, strongly ridged along the line of suture, 3.5–4 cm. long and 2.5 cm. broad; stalk 5–8 mm. long
(15) **K. kinabaluensis**

mm. Leaves rigidly coriaceous; nerves 17–25 pairs, slightly less oblique. Anthers 12–15. Fruit sub-globose, not ridged along the line of suture, 3 cm. in diam.; stalk 3 mm. long
(31) **K. rigidifolia**

kk. Twigs finely striate. Leaves drying a dark brown above or sometimes dark green; nerves less oblique and less prominent; reticulations less promi-

nent; lower surface covered with rusty-stellate scales when young. Fruit obovoid; stalk 1–1.5 cm. long

(4) **K. communis**

hh. Male pedicels 6 mm.–1.5 cm. long (3–4 mm. in *cinerea* var. *rubens*); female more than 2 mm. long. Anthers 9–17, stalked. Fruit variously shaped

nn. Twigs striate right up to the apex, except in *scortechinii*. Leaves elliptic or lanceolate

oo. Leaves elliptic, 9–19 cm. long, drying greenish or yellowish-green above, rigidly coriaceous, glabrous beneath; nerves 7–14 pairs (except in var. *surigaoensis*); reticulations forming a dense, very prominent network above and below. Tomentum at apex of twigs rusty-brown. Fruit tomentulose; stalk 1.5–1.8 cm. long

(17) **K. kunstleri** and its **vars**

oo. Leaves not elliptic, but lanceolate or oblong-lanceolate, the sides nearly parallel, 16–32 cm. long, drying brownish or dark brown above, less coriaceous, covered with stellate scales or hairs beneath when young; nerves 18–30 pairs. Tomentum at apex of twigs light brown. Fruit at first tomentose, the hairs shedding and the fruit becoming tomentulose; stalk 5 mm.–1 cm. long

pp. Twigs tomentulose from the apex to some distance down, coarsely striate from the apex right down their entire length. Leaves medium brown above when dry, lower surface with stellate hairs on the midrib and veins or all over when

young or persisting. Male pedicels 7 mm. long. Fruit ellipsoid (8) **K. erratica**

pp. Twigs tomentulose at the apex only and not striate there, finely striate lower down. Leaves dark brown above when dry, lower surface covered with rusty-stellate scales when young, becoming glabrous. Male pedicels 1–1.2 cm. long. Fruit ovoid-globose (33) **K. scortechinii**

nn. Twigs not striate right up to the apex. Leaves lanceolate, oblong-lanceolate or oblong

qq. Twigs reddish-brown. Leaves membranous, greenish-brown with a blackish tinge above when dry; reticulations fine but distinct on both surfaces; forming a close network. Male pedicels 1–1.5 cm. long. Staminal disc flat. Fruit obovoid, 1.5 cm. long and 1–1.2 cm. broad; stalk slender, 5 mm. long (22) **K. malayana**

qq. Twigs greyish or greyish with black patches here and there (some brownish-black patches in var. *cordata*). Leaves mostly coriaceous or thinly coriaceous, brownish or greenish above when dry; reticulations fainter or sometimes scarcely visible above but quite distinct in var. *andamanica* and var. *cordata*. Male pedicels shorter, usually 5 mm.–1 cm. long (3–4 mm. long in var. *rubens*). Staminal disc slightly convex. Fruit mostly oblong but also subglobose (see under vars for shapes and sizes).

(3) **K. cinerea** and its **vars**

KEY TO THE VARIETIES OF KNEMA CINEREA

a. Leaves not cordate at the base, length usually 10–24 cm., rarely or not exceeding 28 cm., drying greenish or brownish above. Twigs 1–3 mm. thick at the apex and downwards for at least 10 cm.

b. Leaves usually drying greenish or greenish-brown above, (less often brownish), glaucous beneath, oblong or oblong-lanceolate, usually about 5–7 cm. broad, but also narrower, 3–4 cm., or broader up to 10 cm. Reticulations often visible above but fine and not very prominent.

c. Fruit small, sub-globose to slightly obovoid, brick-red, tomentulose, 1.5 cm. × 1.2 cm. on a slender, 7 mm. long and 1 mm. thick stalk. Leaves drying greenish above, 4.5–8.5 cm. broad var. **cinerea**

c. Fruit larger, oblong or ellipsoid, puberulous, becoming glabrous, often blackish or blackish-brown when dry, 2.5–4.5 cm. × 1–2.5 cm.; stalk 7 mm.–1 cm. long and 3 mm. thick. Leaves greenish or less often brownish when dry

d. Fruit covered with extremely short, scale-like tomentum, later sub-glabrous. Leaves 4–10 cm. broad, average 5–7 cm. Male perianth 4 mm. long, tomentulose to sub-glabrous. Anthers 10–17; stalk of staminal disc 1 mm. long var. **sumatrana**

d. Fruit sparsely covered with 1 mm. long, shaggy, plumose hairs, later sub-glabrous, size smaller, 2–2.5 cm. long and 1.3–1.5 cm. broad. Leaves narrower, average 3–4 cm. broad (broader forms 5–10 cm. broad) more distinctly reticulate. Male perianth larger, 5 mm. long, more tomentose; female flowers also slightly larger. Anthers 10–13; stalk of staminal disc 2 mm. long var. **andamanica**

b. Leaves drying a rich brown above, glaucous or brownish beneath, oblong-lanceolate or narrowly oblong, not so wide. Reticulations indistinct or invisible above

e. Leaves narrow with nearly parallel sides, 3–5 cm. broad, acute at the apex; midrib raised above, shining and reddish-brown beneath; nerves oblique. Twigs slender, 1–2 mm. thick at the apex and for

some distance (10 cm.) down where they are covered with a minute, light brown tomentum. Male pedicels 3–4 mm. long. Fruit oblong, 2–2.2 cm. long and 1.5–1.7 cm. broad; stalk 3–5 mm. long and 3 mm. thick. var. **rubens**

e. Leaves slightly broader, 3–7.5 cm. broad, sides not parallel, apex generally obtuse but sometimes acute on the same specimen; midrib lying in a groove above, not shining beneath, nerves nearly horizontal leaving the midrib at an angle of 70° to nearly 90°. Twigs thicker, 3 mm. thick at the apex, the tomentum confined to the apex and not extending down so much as 10 cm. Male pedicels 5 mm.–1 cm. long. Fruit as in var. *cinerea,* sub-globose or slightly obovoid, 1.3–1.5 cm. long and 1–1.3 cm. broad; stalk 7 mm.–1.5 cm. long and 1 mm. thick var. **patentinervia**

f. Flowering pedicels (male) 5 mm.–1 cm. long; fruiting pedicels 7 mm. long. Leaves coriaceous, up to 23 cm. long, nerves 15–25 pairs, proprominent beneath, reticulations faint beneath f. **patentinervia**

f. Flowering pedicels (male) 1.3–1.5 cm. long; fruiting pedicels 8 mm.–1.5 cm. long. Leaves chartaceous, thinner, up to 16 cm. long, nerves 10–16–(22) pairs, fainter beneath, reticulations also fainter. Confined to Borneo f. **longipedicellata**

a. Leaves cordate at the base, length 21–36 cm., drying brownish above. Twigs 5 mm. thick at the apex and downwards for at least 10 cm. var. **cordata**

KEY TO THE VARIETIES OF KNEMA CURTISII

a. Reticulations of leaves faint on both surfaces; apex acute or obtuse

b. Leaves broadly elliptic, less often elliptic-lanceolate, never liguliform or spathulate; apex acuminate or bluntly acute; average length usually 8 cm. and over, average breadth 4–5 cm. var. **curtisii**

b. Leaves lanceolate, elliptic-lanceolate, obovate or spathulate; apex acute or obtuse; average dimensions smaller, 4–8 cm. long and 1.5–3 cm. broad

c. Leaves obtuse at the apex, coriaceous, usually drying blackish brown; veins fine and faint below
d. Leaves elliptic-lanceolate to obovate, 1.5–3 cm. broad (average 2.5 cm.) var. **paludosa**
d. Leaves spathulate or liguliform with nearly parallel sides, 1–1.8 cm. broad var. **amoena**
c. Leaves acute at the apex, chartaceous, usually drying green above, lanceolate, 1–1.5 cm. broad; nerves extremely faint or not visible on both surfaces var. **arenosa**

a. Reticulations of leaves distinct on both surfaces, apex generally obtuse var. **linguiformis**

KEY TO THE VARIETIES OF KNEMA KUNSTLERI

a. Leaves coriaceous, broadly elliptic or elliptic-oblong, apex bluntly acute or obtuse, nerves 7–14 pairs, reticulations very prominent on both surfaces var. **kunstleri**

a. Leaves chartaceous or thinly coriaceous, narrower, oblong-lanceolate, the sides nearly parallel, apex acute or acuminate, nerves 12–20 pairs (average 18 pairs), reticulations not so prominent var. **surigaoensis**

KEY TO THE VARIETIES OF KNEMA LATERICIA

a. Twigs stout, 4–5 mm. thick at the apex and just below. Leaves 17–50 cm. long (average 25 cm.) and 5–20 cm. broad (average 10 cm.), few in number and distantly spaced on the twigs, rounded at the base or rarely sub-cordate. Fruit 3–3.5 cm. × 2.5 cm. with hairs 1.5–2 mm. long var. **lunduensis**

a. Twigs slender, 2–3 mm. thick at the apex and just below. Leaves up to 20 cm. long and to 10 cm. broad, more numerous on the twigs, acute or sometimes rounded at the base. Fruit smaller, up to 2.3 cm. long and to 1.7 cm. broad with shorter hairs, 0.5 mm. long or less
b. Leaves 4–10 cm. broad, average 5–6 cm., drying brownish above and brownish or glaucous beneath; midrib and nerves reddish-brown. Tomentum of twigs, flowers and fruit reddish-brown var. **latericia**
b. Leaves 2–5 cm. broad, average 3 cm., drying a paler brown, greyish-brown or greyish-green, whitish beneath; midrib and nerves also paler. Tomentum of twigs, flowers and fruit pale brown var. **albifolia**

KEY TO BORNEAN SPECIES

a. Leaves covered with cinnamon or whitish scales beneath especially when young, scales persisting in *K. elmeri*

b. Nerves 22–35 pairs; lamina 30–42 cm. long. Male pedicels 1.5–1.8 cm. long. Anthers shortly stalked. Fruit large, 5–7 cm. long and 3 cm. broad (1) **K. ashtonii**

b. Nerves 15–20 pairs; lamina 12–22–(26) cm. long. Male pedicels 4–7 mm. long. Anthers sessile or stalked. Fruit smaller, 1.8–2.5 cm. long and 1.2 cm. broad

c. Twigs angled, their bark greyish-brown and tending to crack or flake. Anthers 10–12, sessile; staminal disc convex. Female flowers sessile, both sexes pale brown outside and scarlet inside. Fruit oblong or elliptic-oblong; stalk 2–5 mm. long (7) **K. elmeri**

c. Twigs terete, their bark dark reddish-brown, finely striate and not tending to crack. Anthers 7–9, shortly stalked; staminal disc flat. Female flowers on a 5 mm. long pedicel, both sexes reddish-brown outside and pink inside. Fruit obovoid; stalk 1–1.5 cm. long (4) **K. communis**

a. Leaves not covered with cinnamon or whitish scales beneath, glaucous or brownish beneath when dry

d. Leaves pubescent or thinly tomentose beneath with stellate hairs

e. Twigs not striate in the apical parts. Veins of leaf sunk above. Male pedicels 3–5 mm. long with bracteole at base of perianth. Female flowers sessile. Perianth red inside. Anthers 7–8–(11 rarely), sessile. Fruit-stalk 2–3 mm. long (20) **K. laurina**

Twigs usually striate in the apical parts. Veins of leaf raised above. Male pedicels 7 mm.–1 cm. long with a median bracteole. Female pedicels 5 mm. long. Perianth yellowish or greenish-yellow inside with a brownish-pink spot at the base of each lobe. Anthers 13–18, shortly stalked. Fruit-stalk about 1 cm. long (5) **K. conferta**

d. Leaves glabrous beneath

f. Bark of trunk and twigs tending to crack or flake (not always apparent unless adequate lengths of twigs are present; may not always be visible in *latericia*)

g. Leaves widest at the middle, cordate or not at the base. Bark tending to crack in the apical as well as in the older parts. Male flowers not mitriform in bud. Male pedicels 3–10 mm. long. Anthers 9–13

h. Leaves large (sometimes small ones at the tips of the twigs) 10–50 cm. long and 3–14 cm. broad, cordate at the base; nerves 24–35 pairs. Male flowers pale yellowish-brown outside, 6–7 mm. long; female same colour, 1 cm. long. Male pedicels 7–10 mm. long, female flowers nearly sessile, their pedicels 2 mm. long. Fruit pale yellowish-brown, sparsely tomentose, oblong, 3.5–4.5 cm. long and 3 cm. broad; stalk 4–5 mm. long
(9) **K. furfuracea**

h. Leaves smaller, 12–32 cm. long and 3–7 cm. broad, (sometimes larger in *latericia* var. *lunduensis*) not cordate at the base; nerves 9–22 pairs. Male flowers reddish-brown outside (pale brown in *latericia* var. *albifolia*) 5–6 mm. long; female same colour, 6–9 mm. long. Male pedicels 3–4 mm. long, female 4 mm. long or flowers sessile. Fruit reddish-brown, tomentose, obovoid or oblong-ellipsoid, 1.7–3.5 cm. long and 1.5–2.5 cm. broad, sessile

i. Bark of trunk longitudinally striate. Twigs 4–6 mm. thick at the apex. Leaves rigidly coriaceous. Male flowers 5–6 mm. in diam., female 8–9 mm. long. Male pedicels 2 mm. thick and female 4 mm. thick. Tomentum of flowers with hairs 1–2 mm. long. Anthers 14–17. Fruit oblong-ellipsoid, 3 cm. long and 2 cm. broad
(28) **K. percoriacea**

i. Bark of trunk flaking irregularly, not longitudinally striate. Twigs 2–3 mm. thick at the apex (except in var. *lunduensis*). Leaves thinly coriaceous, slightly smaller (except in var.

lunduensis). Male flowers 5 mm. in diam., female 6 mm. long. Male pedicels 1 mm. thick, female flower sessile. Tomentum of flowers 0.5 mm. long or less (longer in var. *lunduensis*). Anthers 9–12. Fruit obovoid, 1.7 cm. long and 1.5 cm. broad (larger in var. *lunduensis*)
(18) **K. latericia** and its **vars**

g. Leaves with nearly parallel sides, not widest at the middle, not cordate at the base. Bark tending to crack in the older portions only, consisting of a smooth reddish-brown portion at 3–4 cm. below the furfuraceous apex, and then the older greyish-brown flaking portion. Male flowers mitriform in bud (except when very young). Male pedicels 1.8–2.5 cm. long. Anthers 18–20 (10) **K. galeata**

f. Bark of twigs not tending to crack or flake except sometimes in *membranifolia*

j. Nerves numerous, 20–52 pairs. Leaves large, 20–44 cm. long with nearly parallel sides. Stigma with numerous lobes, 8–12

k. Nerves 40–52 pairs, more numerous than in any other species of *Knema*. Fruit flanged along the line of suture. Anthers about 14. Flowers tomentulose (27) **K. pectinata**

k. Nerves less numerous, 20–40 pairs, fruit not flanged along line of suture (not seen in *woodii*). Anthers (13)–18–23. Flowers tomentulose or tomentose

l. Twigs angled and glabrous at the apex, blackish in patches, lighter or dark grey lower down. Leaves often drying dark grey above, their margins nearly parallel; nerves 23–30 pairs. Flowers tomentulose outside. Staminal disc flat, triangular with 18–23 anthers (37) **K. woodii**

l. Twigs rarely angled at the apex, rusty-furfuraceous, grey-straw-coloured to reddish-brown and glabrous lower down. Leaves usually drying an olive-green above, their

margins sometimes nearly parallel, but shape mostly oblong-obovate, widest at the middle and narrowed to the base; nerves 20–40 pairs. Flowers tomentose outside. Staminal disc convex and circular in outline with 13–18–(20) average 18 anthers (16) **K. korthalsii**

j. Nerves not so numerous, leaves smaller and of various shapes, sides parallel or not. Stigma with fewer lobes, 2–6 (except in *intermedia, uliginosa* and probably *ruja*)

m. Leaves drying blackish above with a glossy metallic lustre. Anthers 3 only, one at each angle of the triangular disc. Fruit rusty-tomentulose becoming glabrous, sometimes ridged or flanged on the suture (19) **K. latifolia**

m. Leaves not drying blackish. Anthers more than 3. Fruit glabrous or not, ridged or not

n. Twigs glabrous, usually pale straw-coloured or at least in parts, smooth, not striate (occasionally a few striations present in the older parts). Leaves usually drying an olive or yellowish green

o. Fruit nearly glabrous, ridged on the suture. Anthers 17–25 (sessile); staminal disc triangular, concave. Bracteole median

p. Leaves often elliptic or widest at the middle (except in some of the varieties where they are lanceolate, spathulate, obovate or linguiform) length up to 14.5 cm; petiole up to 1.2 cm. long. Bark of twigs not flaking. Perianth puberulous outside. Staminal disc triangular with the anthers touching each other. Fruit ellipsoid; stalk 1–1.3 cm. long (6) **curtisii** and **vars**

p. Leaves oblong-lanceolate, not elliptic nor widest at the middle, length 12–25 cm.; petiole 1.5–2.5 cm. long. Bark of twigs occasionally

flaking in the oldest parts. Perianth nearly glabrous outside. Staminal disc circular with well-spaced anthers. Fruit obovoid, sessile or almost sessile; stalk 3–5 mm. long (24) **K. membranifolia**

o. Fruit rusty-tomentose, not ridged on the suture. Anthers 12; staminal disc circular, convex or mammillate. Bracteole at base of perianth (36) **K. uliginosa**

n. Twigs glabrous or not, but not pale straw-coloured, striate or striate in parts. Leaves usually drying some shade of brown but sometimes greenish or greenish-brown

q. Male pedicels 5 mm. long and over, female more than 2 mm. long. Anthers 10 and over, sessile or stalked. Fruit variously shaped

r. Twigs reddish-brown and nearly smooth for some distance down, often striate in the old portions (sometimes smooth). Leaves reticulate, mostly with scalariform reticulations on both surfaces. Bracteoles at base of flower. Anthers 10–15, sessile. Stigma with 8–10 lobes

s. Male pedicels 5 mm.–1 cm.. long. Staminal disc convex or mammillate, connectives not produced beyond the apices of the anthers. Fruit densely covered with short, 0.5 mm. long tomentum

t. Twigs mostly reddish-brown, greyish in the older parts. Reticulations of leaves close and distinct above. Flower buds not depressed in the centre when dry. Male pedicels 8 mm.–1 cm. long. Fruit ellipsoid, 3–4 cm.

long and 1.8–2.2 cm. broad, covered with rusty-stellate scurf which rubs off, stalk 8 mm.–1.2 cm. long

(14) **K. intermedia**

t. Twigs reddish-brown (or not) at the extreme apex only, pale greyish lower down in the younger and older parts. Reticulations of leaves less dense or distinct above. Flower buds often depressed in the centre when dry. Male pedicels 5–6 mm. long. Fruit sub-globose or slightly obovoid, 1.8 cm. long and 1.5 cm. broad, rusty-tomentose, stalk 4 mm. long

(36) **K. uliginosa**

s. Male pedicels 1.5–2 cm. long. Staminal disc concave, connectives produced beyond the apices of the anthers on dehiscing. Fruit sparsely covered with 3 mm. long, shining, rusty-brown hairs

(32) **K. rufa**

r. Twigs reddish brown, greyish or greyish with black patches here and there, generally more distinctly striate, sometimes strongly so. Reticulations prominent or faint. Bracteole normally median but in some varieties of *cinerea* above the middle or even at the base of the perianth (especially in immature flowers). Anthers stalked or shortly stalked, 7–17. Stigma lobes fewer, bifid and then each lobe again shortly bifid

u. Twigs reddish-brown, coarsely striate up to the apex. Leaves elliptic, drying greenish or yellowish-green above, rigidly coriaceous, nerves 7–14 pairs (except in var. *surigaoensis*); reticulations forming a dense network, very prominent and raised on both surfaces. Fruit ellipsoid, less often sub-globose, 2–2.5 cm. long and 1.5 cm. broad; stalk 1.5–1.8 cm. long (17) **K. kunstleri**

u. Twigs reddish-brown or greyish with black patches, not always so coarsely striate at the apex. Leaves not elliptic, mostly lanceolate, oblong-lanceolate or oblong, drying greenish or a rich brown above, membranous or coriaceous; nerves 14–25 pairs; reticulations less prominent, sometimes faint above in some varieties of *cinerea*. Fruit of various shapes, sub-globose, oblong, ovoid, or obovoid, in a range of 1.5–4.5 cm. long and 1–2.5 cm. broad; stalk 5 mm.–1.3 cm. long

v. Twigs reddish-brown. Leaves membranous, greenish-brown with a blackish tinge above; reticulations fine on both surfaces. Male pedicels 1.3–1.5 cm. long. Staminal disc flat. Fruit obovoid, 1.2–1.7 cm. long and 1–1.3 cm. broad; stalk slender, 8 mm.–1.5 cm. long

(3) **K. cinerea** var. **patentinervia** f. **longipedicellata**

v. Twigs greyish or greyish with black patches here and there (some brownish-black patches in var. *cordata*). Leaves mostly coriaceous or thinly coriaceous, drying brownish or greenish above; reticulations faint or sometimes scarcely visible above but quite distinct in var. *andamanica* and var. *cordata*. Male pedicels shorter, usually 5 mm.–1 cm. long (3–4 mm. in var. *rubens*). Staminal disc slightly convex. Fruit mostly oblong but also sub-globose (see under vars for shapes and sizes

(3) **K. cinerea** and its **vars**

q. Male pedicels very short, 2–5 mm. long, female 1.5 mm. long or flowers sessile. Anthers fewer, 6–10, shortly stalked (sessile in *muscosa*). Fruit oblong or obovoid

w. Nerves oblique, 16–20 pairs, raised and very distinct above. Fruit oblong, very strongly ridged along the line of suture, 3.5–4 cm. long and 2.5 cm. broad; stalk 5–8 mm. long (15) **K. kinabaluensis**

w. Nerves less oblique, 10–20 pairs, visible above and raised but less distinct. Fruit obovoid, not ridged along the line of suture, smaller, 1.8–2 cm. long and 1–1.3 cm. broad; stalk 7 mm.–1.5 cm. long

x. Leaves lanceolate, 7–15 cm. long and 2–3.5 cm. broad, not covered with rusty scales beneath; nerves 10–12 pairs;

reticulations very prominent above; petioles very shortly tomentulose but also sparsely long hairs. Perianth densely covered with erect, 0.5 mm. rusty-tomentose with 1 mm. long, stellate and dendroid hairs. Fruit stalk 7 mm. long (25) **K. muscosa**

x. Leaves oblong to lanceolate, 6–25 cm. long and 3–7 cm. broad, average breadth 5 cm., lower surface covered with rusty stellate scales when young; nerves 17–20 pairs; reticulations prominent above, petioles very shortly tomentulose becoming glabrous. Perianth very shortly tomentulose outside. Fruit stalk 1–1.5 cm. long (4) **K. communis**

KEY TO THE VARIETIES OF KNEMA CINEREA IN BORNEO

a. Leaves not cordate at the base, length usually 10–24 cm., rarely or not exceeding 28 cm., drying greenish or brownish above. Twigs 1–3 mm. thick at the apex and downwards for at least 10 cm.

b. Leaves oblong or oblong-lanceolate, 4–10 cm. broad, average 5–7 cm. (variable in size), drying generally greenish, less often brown, glaucous beneath; reticulations of the upper surface often visible but fine and not very prominent. Anthers 12–17, average 14. Fruit oblong or ellipsoid, puberulous, becoming glabrous, blackish or blackish-brown when dry, 2.5–4.5 cm. long and 1–2.5 cm. broad; stalk 7 mm.–1 cm. long var. **sumatrana**

b. Leaves oblong-lanceolate or narrowly lanceolate, usually not so wide, 3–7.5 cm. broad, drying a rich brown above, glaucous or brownish beneath; reticulations of the upper surface indistinct or invisible. Anthers 7–13. Fruit oblong or sub-globose, 1.3–2.2 cm. long and 1.5–1.7 cm. broad; stalks 3–7 mm. long except in f. *longipedicellata*

c. Leaves narrow, 3–5 cm. broad and with nearly parallel sides, bluntly acute at the apex, midrib raised above, reddish-brown and shining beneath; nerves oblique. Twigs slender, 1–2 mm. thick from the apex to some 10 cm. downwards, also minutely light-brown puberulous on that interval. Anthers 7–12. Male pedicels 3–4 mm. long. Fruit oblong, 2–2.2 cm. long and 1.5–1.7 cm. broad; stalk 3–5 mm. long and 3 mm. thick var. **rubens**

c. Leaves slightly broader, 3–7.5 cm. broad, sides not parallel, generally obtuse at the apex but sometimes also acute on the same specimen, midrib lying in a groove above, nerves nearly horizontal, leaving the midrib at an angle of 70° to nearly 90°. Twigs thicker, 3 mm. thick at the apex and the tomentum confined to the apex and not extending down the twig as far as 10 cm. Anthers 10–13. Male pedicels longer. Fruit sub-globose to slightly obovoid, 1.3 cm. long and 1.5 cm. broad; stalk 7 mm.–1.5 cm. long and 1 mm. thick

var. **patentinervia** and its **forms**

d. Flowering pedicels (male) 5 mm.–1 cm. long; fruiting pedicels 7 mm. long. Leaves coriaceous, up to 23 cm. long, nerves 15–25 pairs, prominent beneath, reticulations faint beneath

f. **patentinervia**

d. Flowering pedicels (male) 1.3–1.5 cm. long; fruiting pedicels 8 mm.–1.5 cm. long. Leaves chartaceous, thinner, up to 16 cm. long, nerves 10–16–(22) pairs, fainter beneath, reticulations also fainter. Confined to Borneo

f. **longipedicellata**

a. Leaves cordate at the base, length 21–36 cm., drying brownish above. Twigs 5 mm. thick at the apex and downwards for at least 10 cm. var. **cordata**

SYSTEMATIC PART

(1) **Knema ashtonii** J. Sinclair, **sp. nov.—Fig. 1.**

Propter antheras stipitatas, bracteolam basi perianthii positam, fructum magnum, folia magna sub-cordata subtus cinnamomeo-squamosa, haec species *K. retusae* proxima. Floribus minoribus, antheris paucioribus, disco staminali convexo, fructibus obtusis (non apiculatis), nervis foliorum pluribus et inter se propioribus, reticulationibus magis distinctis *K. ashtonii* tamen differt.

Fig. 1. *Knema ashtonii* J. Sinclair.

A, twig with leaves and male flowers. B, apex of twig showing angles. C, male flower enlarged. D–E, staminal column. F, immature female flower. G, ovary and stigma. H, fruit. I, scales from lower surface of leaf. A, C, D, E and I from *Jaheri 611* (BO). B from *Ashton BRUN 202* (SING). F and G from *Ashton, Smythies & Wood SAN 17386* (SING isotype). H from *Endert 4775* (BO).

Arbor 12–18 m. alta, radicibus adventivis praedita. *Cortex* levis ochraceus. *Ramuli* apice 4–5 mm. crassi, angulati, minute ferrugineo-squamosi vel tomentelli, infra teretes griseo-brunnei, vix striati. *Folia* chartacea, oblongo-obovata, supra glabra, subtus squamis cinnamomeis tecta, deinde glabra, nervis cinnamomeis costaque exceptis, albo-grisea, apice rotundata, obtusa vel breviter apiculata, basi rotundata vel sub-cordata, 30–42 cm. longa, 8–14 cm. lata; costa utrinque prominens; nervi 22–35-jugati, obliqui, paralleli, supra distincti, subtus valde prominentes; venulae distinctae et dense reticulatae; petioli 1–2.5 cm. longi, tomentelli. *Flores masculi* numerosi ex pedunculis lignosis 5 mm.—1 cm. longis umbellatim orti; perianthium ferrugineo-tomentosum, in alabastro 5 mm. longum ac 6 mm. in diam., dein apertum 9 mm.—1 cm. latum, in lobos usque ad ¾ fissum; pedicelli 1.5–1.8 cm. longi, graciles, apice minute bracteolati; discus staminalis convexus cum 11–13 antheris breviter stipitatis coronatus. *Flores feminei* (*immaturi*) oblongi, 5 mm. longi; pedicelli 5–6 mm. longi, apice bracteolati; ovarium ferrugineo-tomentosum; 2–3 mm. longum; stylus brevis in stigma bi-lobatum terminatus; lobi stigmatis etiam minute bi-lobati. *Fructus* obovoideus, fusco-brunneus, tomentellus, 5–7 cm. longus, 3 cm. latus, apice obtusus, pericarpio 4 mm. crasso; stipes 5 mm.—1 cm. longus, 6 mm. crassus.

Tree 12–18 m. high with some stilt roots. *Bark* smooth, ochre. *Twigs* minutely rusty-scaly or tomentulose, angled and 4–5 mm. thick at the apex, lower down, greyish-brown, terete, scarcely striate. *Leaves* chartaceous, oblong-obovate, medium green, glossy and glabrous above, covered with cinnamon-coloured scales beneath, later glabrous and greyish-white except for the cinnamon-brown nerves and midrib, apex rounded and shortly apiculate, less often obtuse, base rounded or sub-cordate; midrib prominent on both surfaces, nerves 22–35 pairs, oblique, parallel, distinct above, very prominent beneath, 1–1.5 cm. apart; reticulations forming a dense close network on both surfaces; length 30–42 cm.; breadth 18–14 cm.; petiole 1–2.5 cm. long. *Male flowers* numerous, arising in umbels from stout, woody, 5 mm.—1 cm. long peduncles; perianth rusty-tomentose, 5 mm. long and 6 mm. in diam. in bud, 9 mm.–1 cm. across when expanded, split down to ¾ of its length into the lobes; pedicels 1.5–1.8 cm. long, slender, with a minute bracteole at the apex; staminal disc convex with 11–13, shortly stalked anthers. *Female flowers* (immature), oblong, 5 mm. long; pedicels 5–6 mm. long with the bracteole at the apex; ovary rusty-tomentose, 2–3 mm. long; a short style present terminating in a bi-lobed stigma,

each lobe again minutely bi-lobed. *Fruit* obovoid, dark brown-tomentulose, 5–7 cm. long and 3 cm. broad, obtuse at the apex, pericarp wall 4 mm. thick; stalk 5 mm.—1 cm. long and 6 mm. thick.

MALAY PENINSULA SELANGOR:	15th mile Pahang Track, *Ridley 8504* (CAL, SING).
BORNEO SARAWAK:	Sungei Sabal Tapang, Sabal F.R., Serian, *Nahar SAR 12697* (SAR, SING); *Sinclair Nos. 10271* (E, K, L, NY, SAR, SING) and *10275* (A, B, E, K, L, SAR, SING).
BRUNEI:	Sungei Temburong, 1 mile above Kuala Belalong, *Ashton, Smythies & Wood SAN 17386* (BRUN, K, L, SAN, SING) & *17387* (SAN, L, SING); Kuala Belalong, *Ashton BRUN 5202* (BRUN, L, SAR, SING).
EAST AND NORTH-EAST BORNEO:	Bukit Milie or Milier = (Müller Range), *Amdjah 170* (BO, SING); Sungei Moegne, (Exp. *Nieuwenhius*) *Jaheri 611* (BO, SING); No. 24 L. Iboet, West Kutei, *Endert 4775* (BO, L).
BRITISH NORTH BORNEO:	Ulu Lukutan, 8 mls E.N.E. of Sipitang, *Wood & Wyatt-Smith A4582* (KEP, L, SAN, SING).
DISTRIBUTION:	Malay Peninsula and Borneo.
TYPE MATERIAL:	*Ashton, Smythies & Wood SAN 17386* (BRUN, K holotype, L, SAN, SING) other duplicates of this, not seen by me, have been distributed to A, BO, BRI & KEP.

This species has been named in honour of P. S. Ashton formerly of the forest service in Brunei. It usually grows by the banks of streams. The distinguishing features are the rusty-brown-scaly, angled, young twigs, the large leaves, often cordate at the base, their cinnamon-brown and later white under-surface, the dense reticulations on both surfaces, the bracteole at the base of the flower, the stalked anthers, and the large fruit.

Ridley 8504 from Selangor was placed by Gamble in *oblongifolia* to which it has some alliance. I mentioned it only in List of Collectors [*Gardens' Bulletin, Singapore* 16 (1958)] as probably *K. glaucescens* var. *cordata* but at that time I had not seen the Bornean material. It has some superficial resemblance to *K. cinerea* var. *cordata* especially in the leaves but the fruit is much larger and on a thick, short stalk. The nearest ally seems to be *K. retusa*.

The tomentum consists of minute, cinnamon-brown scales on the lower surface of the leaf and if this is rubbed off, the dense greyish-white reticulations can be seen. The cinnamon colour of the tomentum tends to disappear on drying. This tomentum of *K. ashtonii* also resembles that of *K. elmeri* but the leaves of that species are smaller and neither rounded nor cordate at the base.

(2) **Knema attenuata** (Hk. f. et Th.) Warb. Monog. Myrist. (1897) 590 incl. var. *latifrons* Warb. l.c. 591; Gamble, Fl. Presid. Madras 2, 7 (1925) 1215.

Basionym: Myristica attenuata Hk. f. et Th. Fl. Ind. (1855) 157 (*Wall. Cat. 6791 nom. nudum*); A.DC. Prodr. 14 (1856) 205; Dalz. et Gibs. Bomb. Fl. (1861) 4; Beddome, Fl. Sylv. 2 (1872) t.271; Hk. f. Fl. Br. Ind. 5 (1886) 110; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 316 pl. 152; Talbot, Syst. List Trees, Shrubs etc. Bombay Presid. (1894) 165 et ed. 2 (1902) 281; Cooke, Fl. Bomb. Presid. 2 (1906) 531.

Synonyms: M. amygdalina Grah. Cat. Bomb. Pl. (1839) 175 non Wall. *M. corticosa* (Lour.) Hk. f. et Th. sensu Beddome, Fl. Sylv. 2 (1872) 271 pl. 271—**Fig. 2.**

Tall tree with flaking bark; sap red, copious. *Twigs* slender, rusty-furfuraceous-tomentose at the apex, often blackish-brown just below the apex, finely striate lower down. *Leaves* chartaceous or thinly coriaceous, elliptic-oblong to elliptic-lanceolate, glossy and glabrous above and drying olive-green, glaucous and glabrous beneath, except in very young leaves, apex acute or acuminate, base cuneate, rarely rounded; nerves 12–18 pairs, raised on both surfaces, curving and gradually ascending, interarching at the margins; reticulations fine but distinct above, forming a close network, less distinct below; length 13–32 cm., average 18 cm.; breadth 4.5–11 cm., average 6 cm.; petiole 1–1.5 cm. long. *Male inflorescence* an umbel at the end of a short, 4 mm. long, slender, woody peduncle. *Male flowers* sub-campanulate or obovoid, trigonous and 4–5 mm. long in bud, rusty-lanose outside with 0.5 mm. long dendroid-like hairs resembling tiny moss plants, glabrous inside with striate, coriaceous lobes which reach down to ½ the length of the whole perianth; pedicels also lanose, 4–7 mm. long with the bracteole at the base of the flower, occasionally above the middle of the pedicel; staminal disc flat or slightly concave with a short, striate stipe and 9–13 (usually 13) sessile, slightly erect anthers. *Female flowers* fewer, cylindric or narrowly ovoid, sessile or sub-sessile; ovary ovoid, densely tomentose; a short bifid

Fig. 2. *Knema attenuata* (Hk. f. et Th.) Warb.
A, twig with leaves and male flowers. B, male flower enlarged. C, staminal column. D, female flowers. E, ovary, style and stigmas. F, fruit. G, hairs from male flowers. A–C and G from *Bor 9387* (DD). D and E after King. F from *Bor 11554* (DD).

style present, each lobe again bifid. *Fruit* oblong or ellipsoid, terminating in a short apiculus, thin-walled, rusty-furfuraceous-tomentose at first, later nearly glabrous, 3 cm. long and 1.6 cm. broad, stalk 7 mm.—1 cm. long, slender with a small collar at the base of the fruit. *Aril* crimson, very thin.

PENINSULAR INDIA S.L.: *Johnson s.n. Herb. Cleghorn* (E).

BOMBAY: S.l., *Hooker, date 1849* (CAL); Khandala, Duke's Nose Ravine, *Santapau 1316* (K); Khandala, Meroli Plakar, *Santapau 1979* (K); Kodkani, *Bor 11180* (DD); the following six Concan:—*Herb. Heyneanum 6423a* (BR) and *s.n.* (BR); *Law s.n.* (Herb. Hk. f. et Th.) (A, K, P); *Dalzell s.n.* (K); *Dalzell, date 1878* (DD); Wari Jungle, *Dalzell s.n.* (CAL, K); the remainder North Kanara:—Yellapur, Dharwa, *Patil 2537* (DD); and *Sedgwick & Bell 6059* (CAL); Arbaie Ghat, *Sedgwick 3169* (CAL); Devimane Ghat, *Bor 11554* (DD) and *Talbot 32* (CAL); N. Kanara, s.l., *Talbot Nos. 41* (PDA) and *108* (CAL); Nayoor, *Talbot 272* (CAL); Mavirimone, *Talbot 273* (CAL, E, K) as var. *latifrons;* Karwur, *Talbot 582* (CAL); North Kanara, *Talbot s.n.* (DD).

MYSORE: Raans Somb., *Brandis s.n.* (DD); the following three South Kanara:—*Beddome s.n.* (BM) as *K. neglecta* Warb. ined.; Pilar, *Fischer 4545* (CAL); Jimdiar, *Meebold 8568* (CAL); the remainder Coorg:—Kerti, Camp 2, *Laurie, 22nd Jan., 1940* (DD, K); Makut, *Bor Nos. 8780* (DD); *9387* (DD) and *9391* (DD) and *Laurie 5474* (DD).

KERALA: The following four Malabar:—*Wight Nos. 869* (E) and *2490* (CAL); Shola Forest, Carcoor Ghat, *Brandis s.n.* (DD); Silent Valley, *Khan M.S.A. 41* (DD); the remainder Travancore:—*Beddome 103* (PDA); *Bourdillon Nos. 431* (K) and *432* (K); *Calder & Ramaswami 1588* (CAL); Achenkovil, *Calder & Ramaswami 403* (CAL); Tennalai, *Calder 1460* (CAL); the last three Colatoorpolay, Tranvancore:—*Bourdillon 505* (DD); *Lawson 93* (CAL) and *Lawson 26th Nov., 1893* (K).

MADRAS: S.l., *Barber 2953* (CAL); *Beddome 222* (K) as *M. travancorica* Bedd. ined.; *Beddome, date 1878* (CAL); *Wall. Cat. 6791* (Herb. Heyneanum) (A, G Prodr., K, LE, M); *Wight 1075* (E); Foot of Nilgiris, *Beddome 215* (PDA); Manan-

toddy, Wynaad, *Forest Economist 29160* (BM, DD); Kuttalam, (Courtallam) *Wight Nos. 783* (E); *2484* (M) and *2486* (A, C, CAL, K, L, LE, P); Anamallay near Coimbratore, *Wight 2487* (L, LE, M); Kannikatty, Tinnevelly, *Barber Nos. 2940* (CAL, K); *3121* (CAL) and *5671* (K); Tinnevelly Hills, *Beddome, date 1867* (PDA).

DISTRIBUTION: Peninsular India as above.

TYPE MATERIAL: *Myristica attenuata* Hk. f. et Th., *Wall. Cat. 6791* (A, G Prodr., K holotype, LE, M). *Knema attenuata* (Hk. f. et Th.) Warb. var. *latifrons* Warb., Kanara, *Beddome's* numbers (B holotype burnt, K). *M. amygdalina* Grah., Wari Jungle, *Dalzell* (CAL, K).

VERNACULAR NAMES: *Chora panu* (Malabar); *chora patthiri* (Tamil); *rukt-maru* (Kanara).

This species is very close to *K. globularia* in many details, especially in the appearance of the twigs and the leaves (the same colour on drying), the structure of the flower (anthers about the same in number and sessile) and in the fruit. The distribution is entirely different, this species being confined to the moist, shady valleys of the west side of Peninsular India. It differs in the longer and broader leaves, which are elliptic-oblong or elliptic-lanceolate in shape, not lanceolate nor oblong-lanceolate, the reticulations more distinct above, the longer male pedicels, the longer and slightly denser tomentum of the flowers and in the larger but similar type of fruit. I do not consider var. *latifrons* as distinct since the leaves vary somewhat in breadth from 4.5–11 cm. on the same plant, the average being 6 cm. broad, but always somewhat elliptic and broadest at the middle.

(3) **Knema cinerea** (Poir.) Warb. Monog. Myrist. (1897) 611 t. 25 f. 1–2 (excl. sp. Philip. *Warburg 13304* = *K. glomerata*).

Basionym: Myristica cinerea Poir. Dict. Encycl. Suppl. 4 (1816) 35 (non Wilkes = *K. korthalsii*); Spreng. Syst. 3 (1826) 65; A.DC. Prodr. 14, 1 (1856) 207; Miq. Fl. Ind. Bat. 1, 2 (1858) 72.

Synonyms: M. peltata Roxb. Fl. Ind. 3 (1832) 846; A.DC. Prodr. 14, 1 (1856) 207; Miq. Fl. Ind. Bat. 1, 2 (1858) 72—**syn. nov.** *M. caesia* Zipp. ex Spanoghe, Linnaea 15 (1841) 346 [Icon. 15] nom. nudum. *K. peltata* (Roxb.) Warb. Monog. Myrist. (1897) 599—**syn. nov.**

var. **cinerea—Fig. 3 A–G.**

Trees 10–12 m. high. *Twigs* minutely pale brown-puberulous and slender (2 mm. thick) at the apex, glabrous, striate and thicker, (3 mm. thick) lower down. *Leaves* membranous or chartaceous, glabrous, oblong-lanceolate or elliptic-lanceolate, olive-green and glossy above when dry, cinereous beneath with pale brown midrib and nerves; apex acute or shortly acuminate, rarely obtuse, base acute, sub-cuneate or occasionally rounded; nerves 12–18 (average 15) pairs, fine and raised on both surfaces, oblique or leaving the midrib at an angle of 70°, curving slightly and interarching at the margins; reticulations scalariform, usually obscure or invisible above but visible in thin leaves, fine beneath; length 12–28 cm.; breadth 4.5–8.5 cm.; petiole 1.5 cm. long, slender, scroll-like or tubular, being involute, almost closed except for the groove on the upper surface. *Male flowers* on simple or bifurcate, 5–6 mm. long, woody tubercles, pale to medium brown-tomentulose and 5 mm. in diam. in bud, 8 mm. across when expanded, split to the base by the thick lobes; pedicels 5 mm.—1 cm. long, striate longitudinally with a minute bracteole at the middle or usually a little above the middle; staminal disc with a very short stipe, circular in outline, slightly convex due to three ridges which meet at its centre; anthers 11–14, average 13, well-spaced, obtuse, shortly stalked. *Female flowers* 5–6 mm. long, cylindrical or oblong, split down half-way by the lobes; pedicels 7 mm.—1.4 cm. long with the bracteole above the middle or a short distance below the perianth; ovary ovoid, rusty-tomentose, the short style ending in a bi-lobed stigma, each lobe again bi-lobed. *Fruit* solitary, brick-coloured, tomentulose, sub-globose or slightly obovoid with the remains of the style at the obtuse apex, 1.5 cm. long and 1.2 cm. broad on a slender, 1 mm. thick and 7 mm. long stalk, pericarp very thin, about 0.5 mm. thick. *Seed* pale brown, filling the carpel.

LESSER SUNDA ISLANDS
Lombok: Sapit, Rindjani Volcanic Range, *Elbert 1950* (A, BO, CANB, K, L, PNH); Sewela, *de Voogd 1640* (A, BO, L).
Sumbawa: Ro Mts, Sultanat Bima, *Elbert 3812* (A, L).
Flores: Wailako, *bb14356* (BO, L); Mborong, *Rensch 1466* (BO).
Tanimbar Islands (Timor Laut): **Pulau Jamdena:**—forest near rest house between Ilgnei and Otimmer, *Buwalda 4158* (BO, K, L, PNH, SING); Lurumbu, *Buwalda 4801* (BO, K, L) and *bb24426* = *Buwalda 207* (A, BO, L, SING); Ilgnei, *bb24279* (BO, K, L, SING).

Fig. 3. *Knema cinerea* (Poir.) Warb. vars. *cinerea* and *sumatrana* (Miq.) J. Sinclair.

A, twig of var. *cinerea* with leaves and male flowers. B–C, the same with male flowers enlarged. D–F, the same, female flowers. G, the same, fruit. H, fruit of *K. cinerea* var. *sumatrana* for comparison. A–C from *Hulstijn 368* (BO). D–F from *bb5430* (L). G from *Teijsmann 12187* (L). H from *Ridley 3873* (SING).

CELEBES North Peninsula:	Winawangan, 4 km east of Manado, *Alston 16205* (BM); Pingsam, Kajuwatu, Minahassa, *Koorders Nos. 17498* (BO, K, L) and *18130* (BO); Manado, *Koorders Nos. 18134* (BO) and *18135* (BO, L, P); Boeha, *Koorders 18140* (BO); Rahaan, Manado, *Riedel 5698* (BO, PDA, U).
Central Celebes:	Tapalaeng, *Noerkas 447* (BO, L, SING); Tjempaga, *Rachmat 160* (BO, L, SING).
South-West Peninsula:	Bantimurung and vicinity, *Buwalda 3804* (A, BO, K, L, PNH); Pangkadjene, *Teijsmann Nos. 11733* (BO, L, SING); *12187* (BO, L, SING) and *12226* (BO); Fienjoh, Baleh Angien, *Teijsmann 12555* (BO, L, SING); Bonthain, *Cel 1/2* (BO).
South-East Peninsula:	Latoma, *Kjellberg 1131* (BO, S).
Pulau Kabena:	Eempuhu, Landschaft Balo, *Elbert 3396* (A, BO, CANB, K, L, PNH).
Pulau Muna:	Lambico, *bb5429* (BO, L, SING) and *bb5430* (BO, L, SING).
Pulau Buton:	*Labillardière s.n.* (BM, FI, G and Prodr., K, P).
MOLUCCAS Sula Islands:	P. Taliabu, Djiko Kamaja, (*Atje*) *Hulstijn 368* (BO, L, SING); Sanana, Sula Bisfi, *Teijsmann s.n.* (BO).
Banda:	Cult. Hort. Calc. ex Banda, *Roxburgh, date 1802* (BR).
DISTRIBUTION:	Lesser Sunda Islands, Celebes and Moluccas.
TYPE MATERIAL:	*M. cinerea* Poir., *Labillardière s.n.* (BM, FI, G and Prodr., K, P holotype). *M. peltata* Roxb., Hort. Calc. ex Banda, *Roxburgh date 1802* (BR).
VERNACULAR NAME:	*Kala* (Makassar, Celebes).

Knema cinerea (Poiret) Warb. was hitherto known only from the single collection in fruit of Labillardière from Pulau Buton. This type material, although distributed in several herbaria, is rather meagre and scrappy. A large amount of material both in flower and fruit of the same species was subsequently collected in Celebes by Koorders and Teijsmann, but no one seems to have been aware that this material was identical with *cinerea*. The bulk of it is mostly unnamed, but some of Koorders's sheets bear the name *M. glauca*. It has also been given various other wrong names. I saw that this material was very close to *K.* (*glauca*) *glaucescens* Jack and had intended to describe it as a variety of *glaucescens*, the main distinguishing difference being the small, sub-globose or

slightly obovoid fruits on slender pedicels. At the time, when I completed the account of the Malayan Myristicaceae, I also must confess that I failed to connect this material with *cinerea* since I had no type material of *cinerea* available for comparison at Singapore.

K. cinerea (Poiret) Warb. has priority over the later *K. glaucescens* Jack, and is the oldest of the several binomials for the well-known and widely distributed *K. glauca* (Bl.) Warb. The varieties of *K. glaucescens* described by me in my revision of the Malayan species have now to be transferred to the position of varieties under *K. cinerea* var. *cinerea*. The former circumscription, *K. glaucescens* var. *glaucescens*, was the correct name in my first paper for the commonest form of *glauca*. Its rank is now altered to that of a variety under *K. cinerea*. Although being the oldest binomial, for the Malay Peninsula, Sumatra and Java plant, the name *glaucescens* unfortunately according to the rules cannot now be used but has to be rejected for the earliest trinomial (if any) even if that trinomial is later than the binomial. The earliest trinomial is *M. glauca* var. *sumatrana* (Bl.) Miq. (1852) so the correct name for *K. glaucescens* Jack, whether we like it or not, becomes *K. cinerea* var. *sumatrana* (Miq.) Sinclair. Had there been no trinomials the name *glaucescens* would have stood as a variety under *cinerea*.

Apart from the best distinguishing character, the small subglobose fruit on slender pedicels, already mentioned, *K. cinerea* var. *cinerea* differs from var. *sumatrana* in having the upper surface of the leaf more glossy with the reticulations very faint or almost invisible. The reticulations, however, may be quite distinct in thin leaves so this character is not always reliable.

Labillardière as mentioned above, collected *K. cinerea* (Poir.) Warb. (=*M. cinerea* Poir.) type at Pulau Buton, and in his "Reise nach dem Südmeere" he identifies it as *Myristica uviformis* Lamk. I have seen the type of *M. uviformis* Lamk. in Paris in Lamarck's Herbarium and the specimen belongs to *Aporosa* (Euphorbiaceae) and not to Myristicaceae. The references for *M. uviformis* Lamk are: — *M. uviformis* Lamk, Act. Paris (1788) 166 et Lamk, Encycl. 4 (1797) 391.

Warburg notes on page 612 of his monograph that *Knema cinerea* may be the same as *M. microcarpa* Willd., after seeing the name *M. microcarpa* written on the British Museum isotype of *K. cinerea* from Pulau Buton collected by Labillardière. Unfortunately there is no type specimen of *M. microcarpa* Willd. preserved at Berlin in the Willdenow collection. Willdenow published his species *M. microcarpa* in Roem. et Usteri, Mag. Bot. 3, 9 (1790) 27 and also refers to it in Sp. Plant. 4, 2 (1806) 871 where he again describes it as "fructuum racemis ramosis". From this

description it can never be a *Knema* so his name *M. microcarpa* does not upset the validity or priority of *K. cinerea* (Poir.) Warb. He quotes as a synonym *M. uviformis* Lamk and refers this to tab. 7 in Rumph. Herb. Amboin. 1 (1750) 27. Lamarck in Encycl. 4 (1797) 391 placed his *microcarpa* with doubt under *M. uviformis.* Merrill in "An Interpretation of Rumphius's Herbarium Amboinense (1917) 231 regards this plate as a *Horsfieldia* species, the *M. tingens* of Bl., and states that nothing in our Amboina collections can be referred to this plate. The plate does show many fruits in racemes so thus cannot be a *Knema.* The fruit with its scars of fallen bracteoles and persistent calyx resembles that of an *Aporosa,* but there is doubt that it represents an *Aporosa* at all, as the fruit apex, there depicted, is not correct for *Aporosa.* In fact it is doubtful also whether the plate represents any member of the Myristicaceae. Willdenow describes two varieties of *M. microcarpa* in Sp. Plant 4, 2 (1806) 871 and refers them to tab. 8 and 9 of Rumphius. Under *Hosrfieldia* (yet to be published) I shall give both Merrill's and my own opinion of what these may represent.

var. **andamanica** (Warb.) Sinclair, **comb. nov.**

Basionym: Knema glauca Bl. var. *andamanica* Warb. Monog. Myrist. (1897) 596.

Synonyms: M. angustifolia Roxb. Fl. Ind. 3 (1832) 847 et Icones Roxb., Kew, ined. No. 2572—**syn. nov.** *M. corticosa* (Lour.) Hk. f. et Th. Fl. Ind. (1855) 158 quoad sp. Tenasserim pro parte, Chittagong et *Roxburgh s.n.* (= *K. angustifolia* (Roxb.) Warb. tantum; A.DC. Prodr. 14 (1856) 205 quoad sp. *Roxb.* tantum; Miq. Fl. Ind. Bat. 1, 2 (1858) 69 quoad sp. *Roxb.* tantum; Kurz, For. Fl. Br. Burma 2 (1877) 284. *M. gibbosa* Hk. f. et Th. Fl. Ind. (1855) 158; A.DC. Prodr. 14 (1856) 205; Hk. f. Fl. Br. Ind. 5 (1886) 112; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 321 pl. 159; Kanjilal & Das, Fl. Assam 4 (1940) 46—**syn. nov.** *M. glaucescens* (Jack) Hk. f. et. Th. Fl. Br. Ind. 5 (1886) 111 quoad sp. andamanica et *Roxb.* tantum; Parkinson, For. Fl. Andaman Islands (1923) 223. *M. glauca* Bl., King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 320 pl. 157 quoad sp. andamanica, burmanica et et nicobarica tantum; Prain in J. As. Soc. Bengal 62, 2 (1893) 74. *K. angustifolia* (Roxb.) Warb. Monog. Myrist. (1897) 561—**syn. nov.** *Knema glauca* (Bl.) Warb. var. *nicobarica* Warb. Monog. Myrist. (1897) 596 pro parte quoad *King 536* (altera pars=*K. laurina*)—**syn. nov.** *K. lenta* Pierre ex Warb. Monog. Myrist. (1897) 584 (*M. lenta* Pierre Msc.); Lecomte Not. Syst. 1, 4 (1909) 101 et Fl. Gén. de L'Indo-Chine 5, 2 (1914) 104—**syn. nov.**—**Fig. 4.**

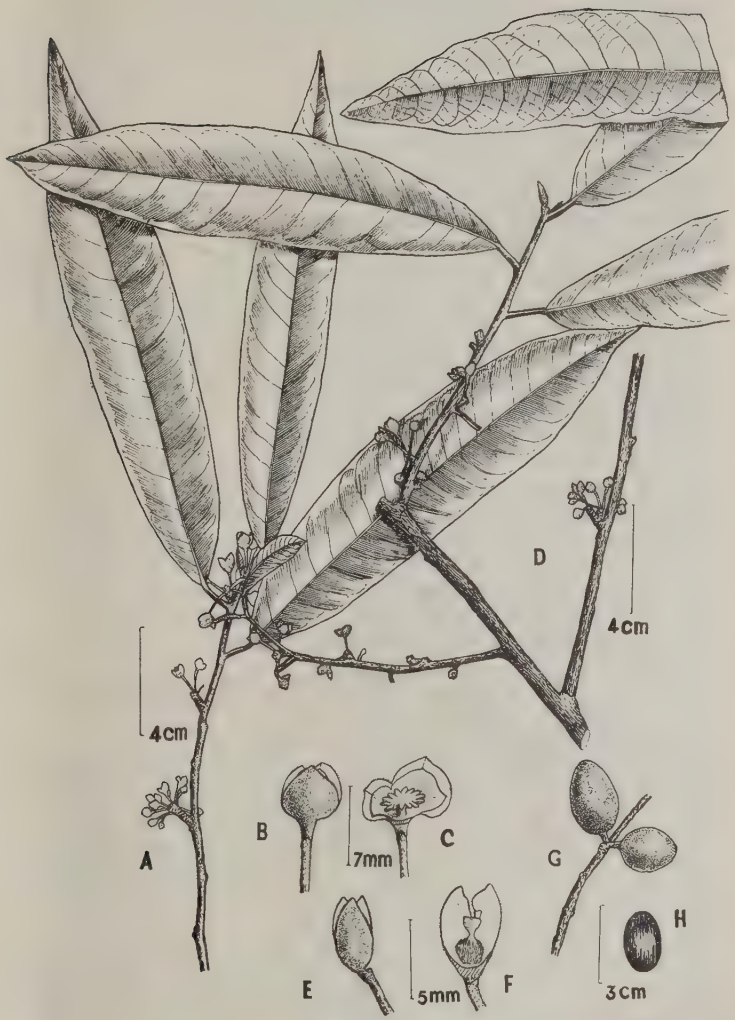


Fig. 4. *Knema cinerea* (Poir.) Warb. var. *andamanica* (Warb.) J. Sinclair. A, twig with leaves and male flowers. B–C, male flowers enlarged. D, same as A but showing older portion of twig. E–F, female flowers. G, fruit. H, seed. A–D from *Maung Ba Pe 12909* (DD). E–F from *Po Khant 13230* (DD). G–H from *V.S. Rao 5727* (DD).

Tree 10–15 m. high. *Bark* dark grey, peeling off in thin flakes; sap red, copious. *Twigs* rusty-tomentulose at the extreme apex, then blackish brown and finely striate, coarsely striate lower down. *Leaves* narrow-oblong-lanceolate, less often oblong, base acute, apex acute or sometimes bluntly acuminate, dark green and shining above, glaucous beneath; nerves 18–24 pairs, fine above, distinct beneath, midrib raised on both surfaces but the lower part on the upper surface lying in a groove which broadens out towards the petiole; reticulations distinct on both surfaces and forming a close network; length 12–20–(25) cm.; breadth 2.5–5 cm., but in some forms 5–10 cm. broad. *Male peduncles* 5 mm.—1 cm. long with scars of previous pedicels. *Male perianth* globose-triquetrous and 5 mm. long in bud, 8 mm. across when expanded, rusty-tomentose or tomentulose with very minute, dendroid hairs outside, glabrous and orange yellow or pale pink inside, thick and split half way or more into the lobes; pedicels striate, 7–9 mm. long with a minute, obtuse bracteole at the middle or rarely at the base of the perianth; staminal disc flat with 10–13 stalked anthers, its stalk striate, 2 mm. long. *Female flowers* oblong to clavate or turbinate, 6–7 mm. long on 5–6 mm. long pedicels with a median bracteole, split down half-way into the lobes; ovary ovoid, rusty-tomentose, 2 mm. in diam.; short style present ending in a bi-lobed stigma, each lobe again divided into 3–4 lobes. *Fruit* ellipsoid, slightly narrowed at each end, rusty-tomentose when young with plumose hairs 1 mm. long, later almost glabrous, 2–2.5 cm. long and 1.3–1.5 cm. broad; stalk slender, 5 mm. long. *Aril* blood-red.

INDIA BENGAL: Western Duars, North Bengal, *Gamble Nos. 2306A* (K) and *2307A* (K).

SIKKIM (EAST HIMALAYA): Darjeeling, *Gamble 2308A* (K).

ASSAM: S.l., *Masters, March 1846* (CAL); Khasi (Khasia) *Clarke 43779* (CAL); *Hk. f. et Th. 1082* (K) and *Hk. f. et Th. s.n.* (A, BM, CAL, G Prodr., P, PDA, W) as *M. gibbosa,* probably both same collection; Bhuban Hill, Cachar, *Kanjilal 4804* (CAL); Naga Hills, *Collett 70* (CAL).

ANDAMANS: Narcodam, *Prain, March 1891* (BM, BO, CAL, G, K, L); Interview Island, *Laurie, 23rd April, 1938* (DD); Mid Andaman, *Parkinson 712* (CAL, DD); Long Island, *Kirat Ram 3658* (DD) and *Parkinson Nos. 706* (CAL, DD) and *764* (DD); North Baratang, *Baker 220* (DD); Baratang, *Parkinson 284* (DD, K); Diamond Island, *Prain, 30th Nov., 1889* (CAL); the remainder South Andaman:—s.l., *Hamilton s.n.* (BM); *Heinig 218* (CAL); *King s.n.* (G, K, L, LE,

MEL, P, SING, U); *King, date 1884* (BM, BO, CAL, K, L, MEL, PDA); *Kurz s.n.* (CAL, G, Prodr., K, M, P); Tusonabad, *King, 20th Aug., 1890* (CAL, PDA); Port Mouat, *King, 27th Dec., 1890* (K, L) and *King, 21st Nov., 1891* (CAL); Balu Ghat, *King, 24th Sept., 1892* (BO, CAL); Dhani Kari, *King, Jan. 1893* (DD, CAL, UPS); Anikhet Hill Jungle, *King, 5th March, 1893* (DD, K, MEL, PDA); Hobdaypur, *King, 30th Dec., 1893* (CAL, P); Manpur, *King, 20th Feb., 1894* (P, CAL); Mount Harriett, *King, 19th Jan., 1895* (P); Ranga Chang, *Prain 141* (DD, SING) and *April 1891* (CAL, SING).

NICOBARS: *King 536* (CAL, L, LE).

EAST PAKISTAN: East Bengal, *Griffith 4348* (A, CAL, K, P) and *Roxburgh s.n.* (BM, P); the remainder Chittagong:—*Cowan 1460* (E); *Dent 95* (DD); *Hk. f. et Th. s.n.* (A, BM, C, CAL, CGE, E, FI, G Prodr., K, L, M, P, PDA, W) as *M. corticosa; Rao, 5727* (DD).

BURMA: S.l., *Brandis Nos. 392* (DD) and *692* (DD); Upper Burma, Denning Outpost, Lohit Valley Road, 28°N, 96° 15'E, *Kingdon Ward 7913* (K); Upper Burma, *Brandis, April 1902* (K); Thaungyun, Upper Burma, *Brandis 409* (DD); Myitkyina, Tagwin Evergreen Forests, *Parkinson 315* (DD); Myitkyina Hills, west of Hopkin, *Parkinson 348* (DD, K); Bhamo, *Cubit 619* (CAL); Kadu Hill, Katha District, *Lace 5093* (DD, E, K); Kokaung, Katha, *A. Roger 806* (CAL); Kinwa Village, Kaladan River, North Arakan, *C. G. Rogers 142* (CAL, DD); Paungbyin Reserve, Mawlaik, *R. R. Chin 252* (DD); Tharrawaddy District, *Parkinson 630* (CAL); Pegu, *Kurz 2431* (CAL, LE, P); Ngaputaw Township, Bassein, *Po Khant 2044* (DD); Pyinmadan, Insein District, *Parkinson 93* (CAL, DD); Myaukhlaing Reserve, Insein, *Po Khant 130* (DD); Mingaladon, Insein, *Po Khant 13230* (DD); Rangoon, *Beddome* s.n. (BM) and *McClelland s.n.* (K); Rangoon, *Dickason Nos. 5394* (A); *5394a* (A); *5542* (A); *5585* (A); *5679* (A); *5828* (A) and *6689* (A); Rangoon, *Po Khant 981* (DD); Karen Country and Hills, Tonkyeghet, Pegu, *Kurz 983* (CAL, FI, M); Moulmein, *Falconer s.n.* (BO, DD, P); Dwana Range, W. Amherst, *Falconer nos. 207* (CAL) and *210* (CAL) and *Lace 4762* (DD, E, K); Su Kon Li

Chaung, Thaungzen Division, *Maung Ba Pe 12909* (DD); Headwaters of Heinze Chaung, Tavoy, *Gage 123* (CAL); Taepe, Tenasserim, *Gallatly 837* (CAL); Mooltar, Tenasserim, *Gallatly 898* (CAL).

INDO-CHINA CENTRAL VIETNAM (ANNAM): Mt Bana, *Clemens 4191* (A, BM, G, K, P, U, UC, US).

SOUTH VIETNAM (COCHIN-CHINA): Bao Miang, Prov. Bien Hoa, *Pierre 22* (BR); Prov. Bien Hoa, *Pierre* (5) *26* (BM, BO, E, G, LE, P); Chua Chuang, *Pierre* (5) *66* (K, LE, P); Baria, Dihn, *Pierre date 1/1867* (LE); Gia Ray, Prov. Bien Hoa, *Poilane 2500* (P, SING); Me Kong, *Thorel 2152* (P).

SIAM NORTHERN DIVISION: Muang Fang, *Kerr 5159* (BK, BM); Chiengdao, *Kerr 5547* (BK, BM); Ban Hue Pa, Me Hawng Sawn, *Kerr 5470* (BK, BM); Me Rim, Chiengmai, *Kerr Nos. 6446* (BK, BM, PNH) and *6447* (BK, BM); Me Li, Lampun, *Winit 265* (BM); Che Sawn, Pa Mieng, *Kerr 3122* (BM).

SOUTH-EASTERN DIVISION: Khao Pra Baht, Chantabun, *Lakshnakara 508* (BK, BM).

SOUTH-WESTERN DIVISION: Chumpawn, *Kerr 11663* (BK, BM).

DISTRIBUTION: India, (E. Bengal, Sikkim, Assam), E. Pakistan (Chittagong), Andamans, Nicobars, Burma, Indo-China, Siam.

TYPE MATERIAL: *Knema glauca* Bl. var. *andamanica* Warb., several syntypes, King's collections; Narcodam, *Prain, March 1891* (BM, BO, CAL, G, K, L); *Kurz s.n.* (CAL, G Prodr., K, M, P); *Hamilton s.n.* (BM). *K. glauca* Bl. var. *nicobarica* Warb., *King 536* (CAL, L, LE) tantum. *Myristica angustifolia* Roxb., E. Bengal *Roxburgh s.n.* (BM, P). *M. gibbosa* Hk. f. et Th., Khasia, Hk. f. et Th. s.n. (A, BM, CAL, G Prodr., P, PDA, W) the Kew specimen is numbered *1082*. *K. lenta* Warb., Prov. Bien Hoa, *Pierre 26* (BM, BO, E, G, LE, P).

VERNACULAR NAMES: *Japokrau* (Burma); *kywe-thway* (Rangoon); *myauk-thway* (Burma); lablu (Kachin); *jhaiphal* (S. Andamans); *mak muang luat; mumuang luat; ma mung luat-noi; luat-kwai* (Siam).

Warburg was the first to give a name to this *Knema* from the Andaman and Nicobar Islands. He recognized that the specimens belonged to *K. glauca*, (now *K. cinerea*) but that they differed slightly. He called those from the Andamans var. *andamanica* and those from the Nicobars var. *nicobarica*. The Nicobar plants, however, represent two different entities. One syntype, *King 536* is identical with *K. cinerea* var. *andamanica* but the other syntype, Kurz's plant, is *K. laurina*. King included the Andaman and Nicobar plants in *glauca* along with the Burmese, Malayan, Javanese and Sumatran but did not give any of them a varietal name. The Javanese and Sumatran plants are var. *sumatrana*. Some of the Malayan are also var. *sumatrana*, but Maingay's numbers are var. *patentinervia*. I have included the Burmese and the Chittagong *M. corticosa* (Lour.) Hk. f. et Th. as well as *M. gibbosa* Hk. f. et Th. from Khasia in var. *andamanica*. I have also included *K. lenta* and other collections from Indo-China as well as plants from Northern Siam in var. *andamanica*. The flowers of *K. lenta* are less tomentose and the plant is nearer to var. *sumatrana*. There has been great confusion with regard to *M. corticosa* (Lour.) Hk. f. et Th. In Flora Indica Hooker f. and Thomson united *Knema corticosa* Lour. from Cochinchina (now *K. globularia*) with the Chittagong, Burmese and Javanese plants. By doing so, they were only partly correct in that *K. globularia* (*K. corticosa* Lour.) does occur in South Burma at Rangoon, Tenasserim and Mergui but not in Chittagong or East Bengal. It resembles var. *andamanica* when sterile, but does not extend further north than South Burma where the two overlap. The var. *andamanica* extends north to Chittagong and Khasia in distributional range. Hooker f. and Thomson suggested that *M. gibbosa* was similar but did not unite it with their *corticosa*. In Flora British India, there is still more confusion, where Hooker placed the Chittagong *M. corticosa* under *M. longifolia* var. *erratica* and the Burmese and Andaman plants under *M. glaucescens* Hk. f. et Th. as well as the Javanese and Sumatran plants. He was of the opinion that *M. glaucescens* Hk. f. et Th. was the same as *K. glaucescens* Jack. He was correct only as in regard to the Javanese and Sumatran plants which indeed are *K. glaucescens* Jack., [now *K. cinerea* var. *sumatrana* (Miq.) Sinclair]. King's *M. glaucescens* Hk. f. et Th. consists mostly of *K. malayana* Warb. Warburg used the name *malayana* because of the confusion and also because *K. glaucescens* Jack was earlier.

K. cinerea var. *andamanica* is closer to var. *sumatrana* than to any of the other varieties. Actually the geographical separation of the two is not so very great when we consider that the distance from the north tip of Sumatra to the southern tip of the Nicobars

is only about 125 miles. Variety *andamanica* differs from var. *sumatrana* chiefly in the larger and more tomentose flowers, the longer stalk of the staminal disc and in the slightly smaller fruit which is at first tomentose with hairs up to 1 mm. long. These hairs are shed later and then the fruit is more like that of var. *sumatrana*. The anthers are 10–13 as against 10–17 in var. *sumatrana*. The leaves are generally narrower with more distinct reticulations, being lanceolate and measuring 2.5–5 cm. in breadth as against 5–10 cm. in var. *sumatrana*, but in the Andamans there are also specimens with broad leaves up to 10 cm. in width as well as ones intermediate in size. King's numbers (syntypes) include plants with narrow, intermediate and broad leaves. The plants from Burma, Chittagong and the other localities generally have narrow leaves. The specimens with the broad leaves look very much like var. *sumatrana* and more so when sterile. Parkinson stated in his Forest Flora of the Andaman Islands, page 223, sub *M. glaucescens*, that he thought there were two varieties, one with broad leaves and the other with narrow leaves. I have examined a lot of material from the Andamans and I do not think that there is any strong argument for further splitting up into varieties on account of the intermediate leaves. I now give some measurements which will show that splitting is unnecessary:—

	cm. broad		*cm. broad*
King s.n. leaves	.. 3–4.5	Baker 220 leaves	.. 5.8–6.5
King s.n. leaves	.. 4.5	Parkinson 706 leaves	.. 7–8
King s.n. leaves	.. 4–5.5	Parkinson 764 leaves	.. 8
Parkinson 284 leaves	.. 4.3–7.5	Kirat Ram 3658 leaves	.. 8–10

Sterile specimens of var. *andamanica* are often difficult to distinguish from those of *K. globularia* (*K. corticosa*) especially in the areas where the two species overlap. This is probably the reason why Hooker f. and Thomson included *K. corticosa* Lour. i.e. *K. globularia* with their *M. corticosa* (Lour.) Hk. f. et Th. In *K. globularia* the leaves are generally thinner in texture and the petiole longer and more slender. The twigs, too are more slender. Both can have purplish brown patches on the twigs. At times one meets specimens which seem almost intermediate between the two. For instance the following from the Col des Nuages near Tourane, altitude 900 m. are troublesome:—*Poilane Nos. 7990; 8073* and *8079*. They have more coriaceous leaves than those of typical *globularia* and also resemble var. *andamanica*. The thickness of the leaves may be due to the altitude. I have named them *globularia* rather than var. *andamanica*. If they are indeed *globularia*, then one may be justified in describing them as a

variety or form of *K. globularia*. *K. cinerea* var. *andamanica* may also resemble glabrous forms of *K. erratica* but that species generally has more veins in the leaf and the reticulations are more distinct. The twigs are striate at the apex and never dark purplish brown.

var. **cordata** (J. Sinclair) J. Sinclair, **comb. nov.**

Basionym: Knema glaucescens Jack var. *cordata* J. Sinclair in Gard. Bull. Sing. 16 (1958) 310 f. 13, D.

Synonyms: Myristica pulchra Miq. in Ann. Mus. Bot. Ludg.-Bat. 2 (1865) 51. *Knema pulchra* (Miq.) Warb. Monog. Myrist. (1897) 600 t. 24 f. 1–2.

SUMATRA WEST COAST: Selungkor, Mid Sumatra, *Koorders 10385* (BO).

PALEMBANG: Rawas, *Grashoff 1019* (BO, L, SING).

MALAY PENINSULA: Trengganu and Johore. For list see Gard. Bull. Sing. 16 (1958) 311.

BORNEO SARAWAK: North slopes of Mount Penrissen, *M. Jacobs 5030* (L, SAR) and *5100* (CANB, L, SAR); Matang, *Smythies SAR 12511* (SAR, SING); *Sinclair Nos. 10339* (A, B, E, K, L, SAR, SING) and *10341* (A, E, SAR, SING).

BRUNEI: Peradayan F.R., *Sow K.F.N. 80168* (K, KEP, L, SING).

WEST BORNEO: Lianggagang, *Hallier Nos. 2994* (BO, L, SING) and *3013* (BO, L, SING, U).

SOUTH AND SOUTH-EAST BORNEO: G. Prarawin, *Korthals s.n.* (L); G. Sakumbang, *Korthals s.n.* (L); G. Provang, *Korthals s.n.* (L); s.l., *Korthals s.n.* (CAL, U).

EAST AND NORTH-EAST BORNEO: No. 24 L. Iboet, West Kutei, *Endert 2721* (A, BO, K, L); No. 29 L. Liah, West Kutei, *Endert 3046* (A, BO, K, L) and West Kutei, *Endert 3141* (BO); Central Kutei, Belajan River, G. Kelopok near Tabang, *Kostermans 10415* (L); Sungei Susuk region, E. Kutei, *Kostermans 5568* (BO, K, L, PNH, SING); Sungei Menubar region, E. Kutei, *Kostermans Nos. 5103* (BO, L, P, PNH); *5209* (BO, K, L, P, PNH) and *5355* (BO, K, L, P, PNH, SING); G. Mentawir, Balikpapan region, *Kostermans 9762* (BO, K, L); Labang, *Amdjah 309* (BO, L, SING); Bukit S. Tulit, *Amdjah 696* (BO, SING, U).

DISTRIBUTION: Sumatra, Malay Peninsula, Borneo.

TYPE MATERIAL: *Knema glaucescens* var. *cordata* J. Sinclair, Trengganu, *Sinclair & Kiah S.F.N. 39959* (A, BM, BO, E, K, KEP, L, P, SING holotype). *Myristica pulchra* Miq., South Borneo, G. Sakumbang, *Korthals s.n.* (L); G. Prarawin, *Korthals s.n.* (L) and River Tewe, *Korthals*, no specimens seen from the latter but this may be sheet *Korthals s.l.* (CAL, U).

var. **patentinervia** (J. Sinclair) J. Sinclair, **comb. nov.**

Basionym: Knema glaucescens Jack var. *patentinervia* J. Sinclair in Gard. Bull. Sing. 16 (1958) 308 f. 13, C.

Synonyms: M. glaucescens (Jack) Hk. f. et Th. Fl. Br. Ind. 5 (1886) 111 pro parte quoad *Maingay 1280.*

f. **patentinervia—Fig. 5 F–H.**

SUMATRA TAPANULI: Padang Si Dimpuan, sub-division Padang Lawas, Pulau Limau, *Rahmat Si Toroes 5593* (L, UC).

PALEMBANG: *Grashoff 737* (BO, L); Ananang, *Buurman v. Vreeden Nos. 136* (BO) and *137* (BO).

BANKA: Gunong Permisan, S. Selan, *Bünnemeijer 2036* (BO); Jebus, *Teijsmann 3475* (BO).

MALAY PENINSULA: Trengganu, Pahang, Selangor, Negri Sembilan, Malacca, Johore, Singapore. For list see Gard. Bull. Sing. 16 (1958) 309. New and first records for Kelantan:—Kampong Gobek, Kerilla Estate, *Mohd. Shah & Kadim Nos. 471* (A, E, K, L, SING) and *520* (A, E, K, L, PNH, SING).

DISTRIBUTION: Sumatra, Malay Peninsula.

TYPE MATERIAL: Negri Sembilan, *Ludin C.F. 1873* (K, KEP, SING holotype).

f. **longipedicellata** J. Sinclair, **f. nov.—Fig. 5A–E.**

Haec forma a *K. cinerea* var. *patentinervia* f. *patentinervia* foliis tenuioribus minoribus, nervis paucioribus minus distinctis, pedicellis floriferis fructiferisque longioribus et a *K. stenophylla* foliis majoribus, nervis magis distinctis, floribus majoribus, pedicellis longioribus, antheris pluribus differt.

Folia chartacea, 5–16 cm. longa, 2–4.5 cm. lata, apice acuta vel leviter acuminata, basi acuta raro rotundata; nervi 10–16–(22)–jugati tenues satis distincti; reticulationes utrinque quoque tenues ± distincti. *Flores masculi* 3–4 mm. in diam., intus pallido-flavidi, antheris c. 12 obtusis stipitatis praediti; pedicelli graciles, 1.3–1.5 cm. longi, medio bracteolati. *Fructus* leviter obovoideus, 1.2–1.7 cm. longus, 1–1.3 cm. latus cum stipite 8 mm.—1.5cm. longo, gracili, 1 mm. crasso.

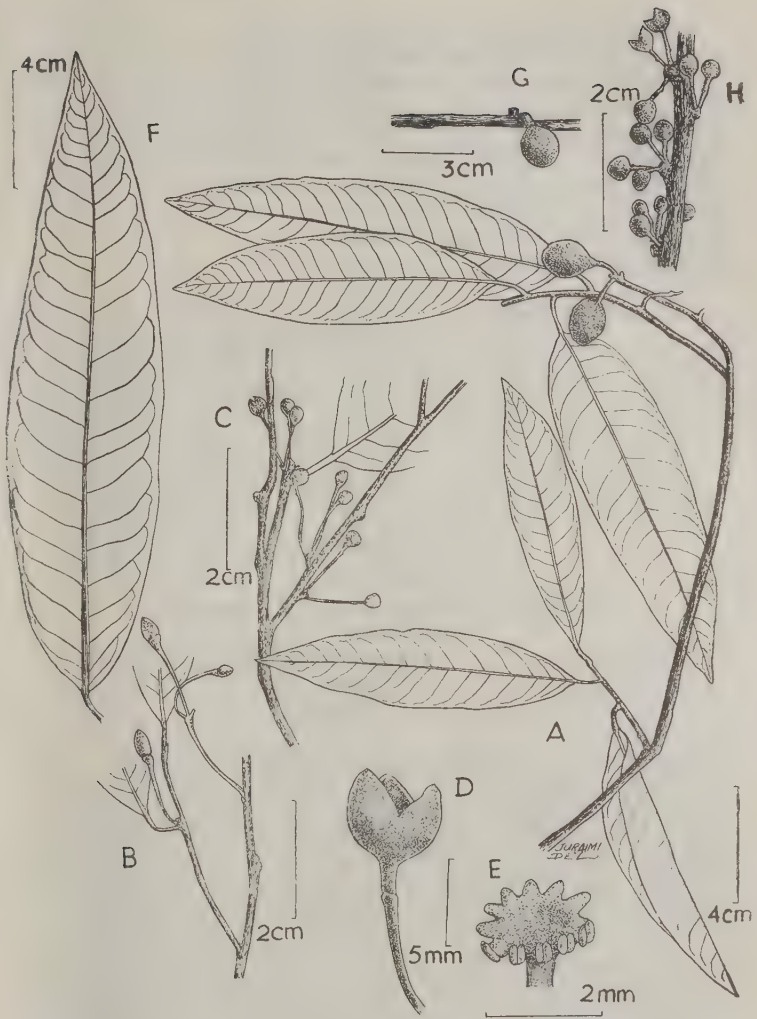


Fig. 5. *Knema cinerea* (Poir.) Warb. var. *patentinervia* (Sinclair) Sinclair f. *longipedicellata* J. Sinclair and f. *patentinervia*

A, twig of f. *longipedicellata* with leaves and fruit. B, the same with very young fruit. C, the same with male flowers. D–E, the same, male flower and staminal column enlarged. F, leaf of f. *patentinervia* for comparison. G, fruit of f. *patentinervia* showing thicker fruit stalk. H, male flowers of f. *patentinervia* showing the shorter pedicels. A from *Clemens 21206* (A). B from *Clemens 20345* (L isotype). C–E from *Purseglove 5041* (SING). F–G from *Corner S.F.N. 28649* (SING). H from *Ludin C.F. 1873* (SING holotype).

Tree 4–10 m. high. *Bark* greyish-reddish brown, rough with some pustules when old but not furrowed or striate; sap red, copious. *Leaves* chartaceous, dark green and glossy above, glaucous beneath with yellowish green midrib, apex acute or slightly acuminate, base acute, rarely rounded; veins 10–16–(22) pairs, slender but distinct; reticulations fine on both surfaces; length 5–16 cm.; breadth 2–4.5 cm. *Male flowers* 3–4 mm. in diam., cream inside with 12 obtuse, stalked anthers; pedicels slender, 1.3–1.5 cm. long with a ± median bracteole. *Fruit* 1.2–1.7 cm. long and 1–1.3 cm. broad, slightly obovoid, stalk 8 mm.—1.5 cm. long, slender, 1 mm. thick.

BORNEO SARAWAK: **1st Division:**—Matang, *Beccari Nos. 1396* (FI) and *1709* (FI, K, P); Telok Asam, Bako National Park, *Purseglove 5041* (A, K, L, NY, SAR, SING); Gunong Gaharu, Serian, *Sinclair 10289* (A, E, K, L, SAR, SING); Gunong Gading, Lundu, *Sinclair 10376* (A, E, K, L, SAR, SING); Gunong Pueh (Mt Poi) *Clemens Nos. 20016* (NY, SAR) and *20345* (A, BO, G, K holotype, L, NY, SAR); Nanga Pelagos, *Daud & Tachun S.F.N. 35627* (A, B, E, K, L, NY, SAR, SING). **3rd Division:**—Kapit, Upper Rejang River, *Clemens 21206* (A, BM, BO, G, K, L, NY, PNH, SAR).

WEST BORNEO: Pulau Tekemeng, *Main 2065* (A, BO, K, L, PNH, SING).

DISTRIBUTION: Borneo (Sarawak and West Borneo).

TYPE MATERIAL: *Clemens 20345* (A, BO, G, K holotype, L, NY, SAR).

This is the Bornean form of the var. *patentinervia*, which differs from the typical form of that variety chiefly in the longer and more slender flowering and fruiting pedicels. It also differs in the thinner and usually smaller leaves with fewer and less distinct nerves. After careful consideration, I have decided that this plant is best described as only a form of var. *patentinervia* and not as a variety since the affinities with typical *patentinervia* are close and obvious and that there is some slight approach by intermediate variations to var. *patentinervia*. This is seen in *Main 2065* and *Daud & Tachun S.F.N. 35627* where the leaves are slightly longer than in the average or typical states of *longipedicellata*, the specimens being somewhat intermediate but nearest to forma *longipedicellata*. There is also a close approach to *K. stenophylla* of the Malay Peninsula but that species has 6–8 anthers and its leaves are smaller with much fainter nerves and reticulations and the pedicels shorter with smaller flowers. The Bornean form *longipedicellata* ascends to over 900 m. on Mt Pueh.

var. **rubens** (J. Sinclair) J. Sinclair, **stat. nov.**

Basionym: Knema glaucescens Jack forma *rubens* J. Sinclair in Gard. Bull. Sing. 16 (1958) 307 f. 13, B.

SUMATRA TAPANULI:	Tutupan, Sub-division Toba, *Rahmat Si* Boeea *6022* (L, UC).
EAST COAST:	Gurach Batu, Asahan, *Yates 1819* (B, BO, NY, P, SING, UC); Masihi F.R., *Krukoff 4087* (A, BO, BR, BRI, G, L, LE, NY, SING, US); near Bandjalinggi, south of Tebing-tinggi, *Lörzing 7467* (BO).
PALEMBANG:	Lematang Ilir, *bb9186* (BO).
MALAY PENINSULA:	Pahang, Johore, Singapore. For list see Gard. Bull. Sing. 16 (1958) 307.
BORNEO SARAWAK:	Matang, *Beccari Nos. 1609* (Fl, G, K, M, S, W) and *2482* (FI, K) syntypes of *K. conferta* var. *borneensis*, see under *K. latericia*.
DISTRIBUTION:	Sumatra, Malay Peninsula, Sarawak.
TYPE MATERIAL:	Singapore, *Ridley 4819* (DD, K, SING holotype).

It will be noticed that I have raised the status of *rubens* from a form to a variety.

var. **sumatrana** (Miq.) J. Sinclair, **comb. nov.**

Basionym: Myristica sumatrana Bl. Rumphia 1 (1835) 187 = *M. glauca* Bl. var. *sumatrana* (Bl.) Miq. in Pl. Junghuhn. (1852) 171.

Synonyms: M. glauca Bl. Cat. (1823) 111; Bijdr. 2 (1825) 576 et Rumphia 1 (1835) 187 t. 60; Miq. in Pl. Junghuhn. (1852) 171; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 320 pl. 157 pro parte excl. sp. andamanica et burmanica (= *K. cinerea* var. *andamanica* et *K. globularia*) et excl. *Maingay Nos 1280—82* (=*K. cinerea* var. *patentinervia*); Koorders et Valeton, Med. Lands Pl. Tuin 17 (1896) 189. *M. glauca* Bl. var. *sumatrana* (Miq. see note) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt. M. corticosa* (Lour.) Hk. f. et Th. Fl. Ind. (1855) 158 pro parte non typica (incl. sp. javanica et born.); A.DC. in Prodr. 14 (1856) 205 pro majore parte non typica; Miq. Fl. Ind. Bat. 1, 2 (1858) 69 pro parte incl. sp. jav., born. et sumatrana tantum. *M. corticosa* var. *lanceolata* Miq. Fl. Ind. Bat. Suppl. 1 (1861) 384. *M. corticosa* var. *sumatrana* (Bl.) Miq. Fl. Ind. Bat. Suppl. 1 (1861) 384. *M. glaucescens* (Jack) Hk. f. et Th. Fl. Ind. (1855) 157 quoad sp. sumatrana tantum; Fl. Br. Ind. 5 (1886) 111 pro parte incl. sp. typicum et excl. *K. globularia*,

K. malayana et *K. cinerea* var. *andamanica*. *M. intermedia* Bl. var. *minor* Miq. Fl. Ind. Bat. 1, 2 (1858) 70—**syn. nov.** *M. geminata* Miq. Fl. Ind. Bat. Suppl. 1 (1861) 385; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 322 quoad sp. sumatrana tantum excl. sp. malayana (= *K. stenophylla*) et excl. pl. 160. *M. palembanica* Miq. Fl. Ind. Bat. Suppl. (1861) 384. *M. wrayi* King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 315 pl. 151. *Knema glaucescens* Jack in Mal. Misc. 7 (1821) 35 et in Hooker's Comp. Bot. Mag. (1843) 357 t. 148; Warb. Monog. Myrist (1897) 616; Sinclair in Gard. Bull. Sing. 16 (1958) 302 f. 12 and 13, A. *K. geminata* (Miq.) Warb. Monog. Myrist. (1897) 604 t. 24 f. 1–2 quoad sp. sumatrana tantum, excl. *K. stenophylla;* Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 247 excl. sp. malayana (=*K. stenophylla*); Ridley, Fl. Mal. Pen. 3 (1924) 72 excl. sp. malayana. *K. glauca* (Bl.) Ward Monog. Myrist. (1897) 594 t. 25 f. 1–3 incl. var. *typica* l.c. 596 et var. *sumatrana* (Miq.) Warb. l.c. 597; Koorders, Exkursionsflora v. Java 2 (1912) 258. *K. palembanica* (Miq.) Warb. Monog. Myrist. (1897) 592 t. 25. *K. wrayi* (King) Warb. Monog. Myrist. (1897) 572 t. 24 f. 1–2; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 243; Ridley, Fl. Mal. Pen. 3 (1924) 70. **—Fig. 3H.**

SIAM PENINSULAR DIVISION: Kopah, Ban Krap, Bukit Tinggi, *Haniff & Nur S.F.N. 2736* (CAL, K, SING) not *globularia;* Nang Yawn, Takuapa, *Kerr 17078* (BK, BM); Kao Den, Patalung, *Kerr 15309* (BK, BM).

SUMATRA S.L.: *Forbes 3141* (L); *Teijsmann s.n.* (L) as *M. corticosa; Teijsmann s.n.* (A, K) as *M. corticosa* var. *sumatrana.*

ATJEH: Deli-Atjeh Border, *W.N. & C.M. Bangham 652* (A, K, NY, SING).

TAPANULI: s.l. *Junghuhn 558* (K); Tobing, Angkola, *Junghuhn s.n.* (CAL (15), L) probably all one collection as type of *M. corticosa* var. *lanceolata* & *glauca* var. *sumatrana.*

WEST COAST: Agam, *bb6578* (BO); Ayer Nancior, Padang, *Beccari 532* (FI, K, L); Mt Singgalang, *Beccari FI acc. no. 7792* (FI); Sungei Batung, *Koorders 10382* (BO); (Padang), *Korthals (17)* (CAL, L); Mt Sago, *Maradjo 57* (L); Bonjol, *Teijsmann 475* (U).

EAST COAST: Botanic Garden, Sibolangit, *Lörzing 5780* (BO, L, SING); vicinity of Huta Bagasan, Asahan, *Rahmat Si Boeea 6802* (A, SING, US); vicinity of Aek Moente (Aer Mutte) north-east of Tomuan Dolok and west of Sahabat, Asahan, *Rahmat Si*

Boeea 9131 (A, L); Gurach Batu, Asahan, *Yates 1715* (B, BO, P, NY, SING, UC); Sigmata near Rantau Parapat, Bilia, *Rahmat Si Toroes 3230* (A, L, NY, UC, US).

INDRAGIRI: Indrag. Uplands:—Kuala Belilas, *Buwalda 6736* (BO, L); S. of Pekan Heran, *Buwalda 6782* (BO, K, L, SING); Kritang River, *Buwalda 6968* (K, L, P, SING); Muara Padjanki, *Buwalda 6448* (BO, K, L) narrow leaved form.

BENKULEN: *Jack, date 1821* (L); Redjang, Karanganjar, *bb Nos. 7290* (BO, L, SING) and *8846* (BO).

PALEMBANG: Near Paoe, *Forbes 2466* (BM, CAL, L, LE, P); Lampar, Moesi River, *Forbes 2606* (BM, CAL, L, LE); Tandjong Ning, *Forbes 2718* (A, BM, FI, L, LE, P, PNH, SING); Bukit Tjirmin near Suka Radja, *Forbes 2916* (A, BM, CAL, K, L, P, SING); Lematang Ulu, *Lambach 1296* (BO, L); north foot of G. Pakiwang, north-west of Ranaumeer, *v. Steenis 3433* (B, BO, L, SING); Muaraduwa (dewa) *Teijsmann 3550* (BO, CAL, U); Ogan Ulu, *Endert 59* (BO, L) and *Teijsmann 3735* (BO, CAL, U); Dermo Enim, *Teijsman Nos. 3640* (BO, U); *3641* (BO) and *3791* (BO, U); Batu Radja, Kebur-lahat, *Teijsmann 3620* (BO, CAL, MEL, U); Batu Radja, Kebur-lahat, *Teijsmann s.n.* (A, CAL, L, LE, MEL, U) and *3924* (BO, CAL, U) probably all one collection, numbered later.

LAMPONG: Wai Lima, Lampong Estate, *Iboet 400 8846* (BO).

PULAU WEH: *Koorders 10531* (BO).

PULAU SIMALUR: *Achmad Nos. 198* (BO, L, SING); *206* (BO, K, L, SING, U); *647* (BO, SING); *685* (BO, L, SING, U); *840* (BO, L, SING, U); *1139* (BO, L, SING); *1143* (BO, SING); *1176* (BO, L, SING, U); *1459* (BO, L, SING, U); *1576* (BO, SING) and *1579* (BO, L, SING).

PULAU SIBERUT: *Kloss S.F. Nos. 14496* (BM, BO, K, SING, UC) and *14569* (BO, K, SING) and *Iboet 164* (B, BO, L, SING).

BANKA: G. Maras, *Kostermans & Anta 1299* (BO, K, L, P, PNH); G. Mangol, *Kostermans & Anta 652* (BO, K, L, P, SING); Lobok Besar, *Kostermans & Anta 922* (K, L, P, PNH, SING) on the L sheet var. *patentinervia* is also mounted; Pangkat-pinang, *Teijsmann s.n.* (BO, SING).

MALAY PENINSULA: Kelantan, Perak, Selangor, Malacca, Johore, Singapore. For list see Gard. Bull. Sing. 16 (1958) 304.

JAVA S.L.: *Blume s.n.* (A, C, LE, NY) as *M. corticosa; Blume s.n.* (BO, L, P) several sheets as *M. glauca; Commerson* (*Herb. Martius*) (BR, P); *Gesker* (L); *Hasselt s.n.* (L); *Horsfield* (BM, CGE, K) the CGE sheet is numbered *3; Junghuhn 561* (K); *Kollmann* (G. Boiss, NY); *Korthals s.n.* (K); *Labillardière s.n.* (K); *Leschenault s.n.* (P); *Reinwardt Nos. (6)* (L); *(17)* (L); *(18)* (L); *Teijsmann s.n.* (BM, L, LE, P); *Teijsmann & de Vriese, date 1859–60* (L); *de Vriese* (*Herb. Pierre 5469*) (L, P); *Zollinger Nos. 809* (P) and *1398* (P).

WEST JAVA: Tjimara, Udjong Kulon, Prov. Bantam, *Koorders Nos. 5263* (BO, CAL, L) and *5286* (CAL); Udjong Kulon, *Kostermans, July 1949* (BO, K, L, SING); Kosala, Prov. Bantam, *Forbes Nos. 486* (BM, BO, CAL, LE, PNH) and *592* (BM, BO, CAL, FI, K, SING); Gunong Karang, Pulasari, Pandeglang, Prov. Bantam, *Koorders Nos. 5258* (BO) and *5259* (BO); Batavia, *Junghuhn s.n.* (BM, CAL, L); near Batavia, *Kollmann* (BM); Depok, *Koorders 42238* (BO); Jianten, south of Leuwiliang, west of Bogor, *Backer 25964* (BO, L, SING, U); Hadjere, Janlappa, Bogor, *Utja & Wasijat Ja Nos. 6171* (BO, L); *6192* (BO, L); *6202* (BO, L); *6574* (BO, L); *6610* (BO, L); *6611* (BO); *6615* (BO, L); *6676* (BO, L); *6688* (BO, L) and *6786* (BO, L); the following five Gunong Salak, *Blume* (L, NY); *Koorders Nos. 24289* (BO) and *24291* (BO, L); *Nees s.n.* (LE) and *Teijsmann H.B. 3057* (BO); Tjampea, *Koorders 30472* (BO); Pangrango, *H.B. 3060* (BO); Natur monument, Nusagede, Pendjalu, *Koorders 44595* (BO); Natur monument, *Beumée 6079* (BO); Madjenang, *Backer 18687* (BO, SING); Pasir Tjirangsad, *Bakhuizen v.d. Brink 3796* (BO); the remainder in Preanger:—Pelabuan-ratu, *Koorders Nos. 5243* (BO); *11791* (BO) and *33082* (BO); Tjadas, Malang near Tjidadap, *Bakh v.d. Brink Nos. 438* (BO, L) and *3001* (BO); Tjampaka near Tjidadap, Mt Tugu, Pasir Angin, *Buwalda 3583* (K, SING); Tjampaka, Tjiharum, *Buwalda 3625* (K, SING); Tjidadap, G. Besar, Tjibeber, *Winckel 308* (BO, CAL, L, U); the following Koorders numbers Takoka, Preanger:—*Koorders Nos. 5244* (BO, CAL); *5245* (BO, L); *5247* (BO);

11794 (BO, K); *12046* (BO); *12048* (BO); *25620* (BO, K, L); *25635* (BO, K, L); *25732* (BO, K, L, SING); *25779* (BO, K, L) and *32714* (BO); Tjimas, *Koorders 5253* (BO, L); Sanggarawa, *Koorders Nos. 5254* (BO, L) and *5255* (BO, L); Mid Preanger, Tjiguludug, Bandung, *Ja 1502* (BO); Tjisewa, south coast, *Warburg 3184* (L, M).

MID JAVA: Djatibosch, East Tegal, *Beumée 3687* (BO); Tjilatjap, *Ja 2919* (A, BO, L) and *Ja 2448* (A, BO, L) and *Koorders 30294* (BO); Kedu, Sempor, north-west of Gombong, *Brinkman 655* (A, BO, K, L); the following seven Pekalongan, Subah:—Wanasari near Morgasari, *Boot 3311a* (BO); Gondang, *Hoffmann 6541* (BO) and *6609* (BO); *Koorders Nos. 13335* (P, BO); *13561* (BO); *14258* (BO) and *27481* (BO, K, L); Prigi, *Backer Nos. 11788* (BO) and *11954* (BO, SING); Wonosobo, *Ja Nos. 2505* (A, BO, L) and *2533* (A, BO, L); Bodja, Darsepono, Semarang, *Beumée 8881* (BO); Karangasen, Semarang, *Koorders 5295* (BO, L, P); the following four in Djapara:—*Teijsmann s.n.* (BO, CAL, U) as *M. intermedia* var. *minor; Zollinger s.n.* (W); Ngarengan, *Beumée 574* (BO) and *Koorders Nos. 33609* (BO) and *35722* (BO); Pati, Pangonan, *Ja 1790* (BO); Kedalon, Rembang, *Ja 1547* (BO).

EAST JAVA: Pogal, *Mousset 1139* (L); Bodjonegoro, Klino, *Ja 2036* (BO, L); Gunong Pandan, *Koorders Nos. 12399* (BO, SING, U) and *12404* (BO); and *Thorenaar Nos. 59* (BO); *75* (BO); *269* (BO) and *356* (BO); Gadungan Pare, Kediri, *Koorders Nos. 22777* (BO, K, L) and *22838* (BO, BR, G Boiss., L); Tangkil, Pasuruan, *Koorders 23513* (BO) and *23943* (BO, K, L); Lumadjang, *Zollinger 2650* (BO, FI, G Boiss., MEL, P) and *s.n.* (U); Pantjur Idjen, Besuki, *Koorders Nos. 5282* (BO, K, L); *5288* (BO); *13084* (BO); *14616* (BO, P); *14617* (BO, L, P); *14618* (BO); *14619* (BO); *21607* (BO, L, P); *21634* (BO, L); *28613* (BO, K, L) and *32291* (BO); Tjurmanis, Besuki, *Koorders Nos. 5289* (BO) and *5298* (BO); Muntjar, *Becking 54* (BO); Kali Wiming, Djember, *Backer 18330* (BO, SING); Sanga, Mumbul, *Backer 30629* (BO, SING); Rogodjampi, Besuki, *Koorders Nos. 5269* (BO); *5283* (BO, K, L); *5285* (BO, L, P); *5286* (BO); *5287* (BO, L); *5290* (BO, L); *5293* (BO, L); *13147* (BO,

L); *13257* (BO); *13270* (BO); *29021* (BO, G Boiss., K); *38902* (BO, K) and *39343* (BO).

ISLANDS NEAR S.W. BANTAM: Pulau Meeuwen, *Kostermans, June 1950* (A, BO, L, PNH, SING); Pulau Peutjang, *Sinclair 10010* (A, B, BM, E, K, L, M, NY, P, PNH, SING); Pulau Panaitan, Mt Tendjo, *J.v. Borssum Waalkes 402* (BO); Pulau Panaitan, Tandjong Kadam, *J.v. Borssum Waalkes 587* (BO, L).

NUSA KAMBANGAN: Banjumas specimens, Mid Java, are also placed here as Koorders wrote Banjumas, Nusa Kambangan on his labels. He also sometimes wrote Nusa Kambangan or Banjumas only. Probably most or all of his specimens came from Nusa Kambangan and he intended Banjumas to mean Banjumas residency. *Koorders Nos. 3491* (BO, L); *5273* (BO); *5276* (BO, L); *5278* (BO, L); *5279* (BO, L); *5281* (A, BO, L, P); *12174* (BO); *12183* (BO); *12212* (BO); *15670* (BO, G Boiss., L, P); *20084* (BO, L); *20151* (BO); *20286* (BO); *21907* (BO); *21913* (BO); *24686* (BO, L, P, UC); *26938* (BO, K, L, P, U); *26940* (BO, K, L, P) and *27158* (BO); Banjumas, Pringombo, *Koorders Nos. 27184* (BO, L, UC); *33866* (BO) and *33889* (BO, P, SING); Nusa Kambangan near Tjimiring, *van Straelen 13* (BO).

NUSA BARUNG: *Koorders Nos. 5291* (BO, K, L) and *5292* (BO).

MADURA: Mt Geger, *Teijsmann H.B. 1754* (BO, L).

LESSER SUNDA ISLANDS BALI: Tjandikusuma, *Becking 145* (BO); Mt Sangiang Complex, Negara, West Bali, *Kostermans, Kuswata, Soegeng & Soepadmo Nos. 285* (BO, L) and *298* (BO, L); Pura Abian, Tuwung, Sanguidingin, Tabanan, *Kostermans, Kuswata, Soegeng & Soepadmo 238* (L, SING).

BORNEO SARAWAK: *Beccari 1094* (FI, K, P); *Haviland* (*Garai*) *1036* (K); North slopes of Mt Penrissen, 1st Division, south of Kuching, *M. Jacobs 5081* (CANB, L, SAR, SING); Gunong Gading, Lundu, 1st Division, *Sinclair 10361* (A, B, E, FI, K, L, M, NY, SAR, SING); Tanjong Kibong, *Daud & Tachun S.F.N. 36081* (BM, SAR, SING); Gat, Upper Rejang River, 3rd Division, *Clemens Nos. 21600* (A, BM, BO, K, L, NY, PNH, SAR) and *22119* (A, BO, K, NY, SAR); River Kenaban, Upper Plieran, 3rd Division, *Pickles SAR 3624*

(L, SAR, SING); the remainder 4th Division:—Bukit Mersing, Tau Range, *Purseglove 5188* (K, L, NY, SAR SING); North slopes of Mt. Kalulong, *Pickles SAR Nos. 3738* (BM, L, SAR, SING) and *3757* (BM, L, SAR, SING); Bintulu, Jelalong, *Senada SAR 10111* (SAR, SING); near Long Kapuas, Mt Dulit (Ulu Tinjar), *Richards 1107* (A, K, L, SING).

BRUNEI: Andulau F.R., *Ashton BRUN 588* (SING); north slopes of Bukit Patoi, Temburong, *Ashton, Smythies & Wood SAN 17401* (BRUN, K, L, SAN, SING).

WEST BORNEO: Sungei Sambas, *Hallier 1125* (BO, L, SING, U); Pulau Lumukutan, *Hallier 323* (BO, L, SING, U) and a separate collection *323 = K. laurina;* Sungei Landak, *Teijsmann s.n.* (BO); Suka Lanting, *Hallier 8* (BO, L, SING); Kapuas, *Teijsmann Nos. 8230* (BO, FI, SING) and *8674* (BO, FI, SING); Sungei Sibau, *Hallier 1192* (BO, L); Melawi, Ng. Risang, B. Bragan, *bb26354* (BO, L).

EAST AND NORTH-EAST BORNEO: Mt Ilas Bungaan, Berouw (= Berau), *Kostermans 13900* (L); L. Iboet, West Kutei, *Endert Nos. 2557* (A, BO, K, L) and *2822* (BO, K, L); Mt Maranga on Tundjung Plateau, West Kutei, *Kostermans 12577* (L); Belajan River, Gunong Kelopok near Tabang, Central Kutei, *Kostermans Nos. 10451* (CANB, L, SING) and *10559* (CANB, L, P); Gunong Tepian Lobang, East Kutei, *Kostermans 5351* (BO, K, L); Pembliangan, *Amdjah 941* (BO, L, U); Sungei Milier (Müller Range), *Amdjah 171* (BO); Sungei Octung, *Amdjah 343* (BO); Tikung, *Amdjah 938* (BO, L, SING, U); Sungei Magne, *Jaheri 619* (BO); Sungei Pary, *Jaheri 1133* (BO, SING); Sungei Sok, *Jaheri 1755* (BO); Loa Djanan River region, west of Samarinda, *Kostermans 9948* (BO, L); Sungei Wain region, north of Balikpapan, *Kostermans 4327* (BO, L).

BRITISH NORTH BORNEO: Kinabatangan, *Evangelista 1109* (A, NY); Suanlamba watershed, Sandakan, *Castillo 646* (A, PNH, US); Payo River, *Allen Nos. 625* (A, NY) and also *K. latericia* var. *latericia* and *628* (NY); Beaufort F.R., Jesselton, *Sow K.F.N. Nos. 71651* (KEP) and *71654* (KEP) small form, not *stenophylla;* the following Penibukan, Kinabalu, *Clemens Nos. 30505* (A,

B, BO, G, K, L, M, UC); *30888* (A, BO, K, L, NY, UC); *32027* (A, BO, G, L, NY, UC); *32156* (A, BO, NY) and *32202* (A, BO, G, K, L, M, NY, UC); Marai Parai, Kinabalu, *Clemens 32852* (A, BO, G, L, NY, UC); Tenompok, Kinabalu, *Clemens 28766* (G, K, NY); on hill south of Tabilong, at mile 18 on path from Kota Belud to Kudat, *Wood & Wyatt-Smith A4237* (KEP, P, SAN, SING) small form, not *stenophylla;* *Ulu Moyah, 8 mls. S.S.E. of Malaman, Sipitang, *Wood SAN 16669* (KEP, L, SAN, SING; Ulu Mendalong, 6 mls. S.S.E. of Malaman, Sipitang, *Wood SAN 16733* (KEP, L, SAN, SING); Ulu Lukutan, 8 mls. E.N.E. of Sipitang, *Wood & Wyatt-Smith A 4578* (KEP, L, SAN, SING); Karukan, *Goklin 3022* (K, L, PNH).

BANGUEY ISLAND: *Castro & Melegrito 1451* (A, BO, UC).

CULTIVATED: Hort. Bog. *Beccari 5618* (FI, K) origin Palembang; *Beccari Nos. 7788* (FI) and *7788a* (FI); Herb. Reg. Monacense, *Blume s.n.* (M); Hort. Bog. *IVG 83* (L); *IVG 93* (NY); *Teijsmann 7685A* (FI) origin Kapuas, Borneo; *Warburg 1739* (C, G Boiss., L, LE, M) origin Sumatra.

DISTRIBUTION: Siam (rare), Sumatra including Banka, Malay Peninsula, Java, Lesser Sunda Islands to Bali only, east of Bali, i.e. in Lombok it is replaced by var. *cinerea,* Borneo. It should be noted that Wallace's line passes between Bali and Lombok.

TYPE MATERIAL: *Knema glaucescens* Jack, Sumatra, *Jack, date 1821* (L). *M. geminata* Miq., Batu Radja, Kebur-lahat, Sumatra. *Teijsmann Nos. 3620* (BO, CAL, MEL, U); *3924* (BO, CAL, U) and *s.n.* (A, CAL, L, LE, MEL, U holotype). *M. glauca* Bl., Blume's collections, *s.n.* from various localities in West Java, G. Salak (L, NY) several sheets; s.l. (BO, L, P) several sheets. The following other localities are quoted by Blume but not written on the sheets:—Tugu, G. Gede, Pangrango, Tjisambang, G. Parang and Tjiradas. *M. intermedia* var. *minor* Miq., Djapara, Java, *Teijsmann s.n.* (BO, CAL, U holotype). *M. palembanica* Miq., Derma-Enim, Sumatra, *Teijsmann Nos. 3640* (BO, U); *3641* (BO) and *3791* (BO, U). *M. sumatrana* Bl., Padang, Sumatra, *Korthals s.n.* (CAL, L holotype).

* See addenda. I have removed it to *K. cinerea* var. *alpina.*

The reason for the name change of this well-known plant has already been given under *K. cinerea* var. *cinerea*. In the citation of literature, I have purposely avoided quoting Blume in brackets in the new combination, because the priority in this case dates from Miquel's trinomial. The actual alternative name given by Boerlage for *K. glauca* (Bl.) Warb. var *sumatrana* is *M. glauca* Bl. var. *sumatrana* (Warb.) Boerl., but it should have been var. *sumatrana* (Miq.) Boerl. It will be noticed that Boerlage gave alternative names for most species of *Knema* described by Warburg, transferring them back to *Myristica*, but he did not specifically say he did not uphold the genus *Knema*. It may be that he was determined to have some credit should botanists in future not agree to accept *Knema* as distinct from *Myristica*.

Perhaps I may have lumped too many specimens under *K. cinerea* var. *sumatrana*, including some from Borneo with narrower leaves than in the typical var. *sumatrana*. Variety *sumatrana* is the commonest one and has a wide distribution. I have included *K. geminata* from Sumatra in it, but perhaps the latter might have been separated from it as another variety or form. I have seen some specimens of *geminata* with a few large leaves and a greater number of small leaves on the same sheet, so in any case it is extremely close to typical *sumatrana* with its larger leaves.

(4) **Knema communis** J. Sinclair in Gard. Bull. Sing. 16 (1958) 297 f. 10 & pl. IXB.

Female flowers (mature) 5–6 mm. long and 4 mm. broad, rusty-tomentulose on a 7 mm. long pedicel; bracteole median or slightly above the middle; ovary ovoid, rusty-tomentose, 3 mm. long with a bi-lobed stigma, each lobe again bi-lobed.

MALAY PENINSULA:	Perak, Trengganu, Selangor, Singapore. For list see Gard. Bull. Sing. 16 (1958) 299. New and first record for Kelantan: —Kampong Gobek, Kerilla Estate, *Mohd. Shah & Kadim 526* (A, E, K, L, PNH, SING).
BORNEO SARAWAK:	Mt Matang, *Beccari Nos. 1815* (FI) and *1960* (FI, K).
SOUTH AND SOUTH-EAST BORNEO:	Hayup, *Hubert Winkler Nos. 2466* (BO, G, K, L, P, PNH, SING) and *2467* (BM, BO, BR, G, K, L, P, SING).
DISTRIBUTION:	Malaya, Sarawak, South and South-East Borneo.
TYPE MATERIAL:	*Sinclair S.F.N. 40522* (BKF, BM, BO, DD, Delhi Univ., E, K, KEP, L, M, P, PNH, SAN, SING holotype).

This species when sterile resembles *K. scortechinii* but has smaller leaves and more slender twigs. There are 7–9 anthers as against 10–14 in *scortechinii*. *Beccari Nos. 1815* and *1960* are quoted by Warburg as part of the syntypes of *K. conferta* var. *borneensis*. See also under *K. latericia*. *Lake & Kelsall, 6th Nov. 1892* from Johore and the following from Singapore recorded in Gard. Bull. Sing. 16 (1958) 296 as *K. malayana* should be altered to *K. communis*. They have smaller leaves, but seem to fit in here best:— *Ridley Nos. 1833 & 6447* and *Sinclair S.F. Nos. 40717 & 40280*. *Sinclair S.F.N. 40386* distributed as *K. malayana* should also be changed to *communis*. They also resemble *cinerea* var. *sumatrana* but are not exactly that as all three species are close and they may represent a hybrid between *communis* and one of the other two, probably *cinerea* var. *sumatrana* but we cannot be certain and it is better as stated to place them with *communis*.

(5) **Knema conferta** (King) Warb. Monog. Myrist. (1897) 578 t. 24 f. 1–2; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 243; Ridley, Fl. Mal. Pen. 3 (1924) 70; Sinclair in Gard. Bull. Sing. 16 (1958) 286 f. 6.

Basionym: Myristica conferta King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 315 pl. 150.

SUMATRA	TAPANULI:	Angkola & Sipirok Panobasan, Kd. Puhatan Lajan, *bb29518* (A, BO, L); Labuan Baju, Sibolga, *bb19392* (A, BO, L); Sirameramian, Sibolga & Ommelanden, *bb26984* (BO, L).
	EAST COAST:	Langkat, Bubu, *bb9369* (BO); Beneden, Langkat, Alur Gusta, *bb16406* (A, BO, L).
	INDRAGIRI:	Danau Mengkuang, Riouw & Ond., Indrag. Bovenlanden, *bb27497* (BO, L); Kuala Belilas, *bb27591* (BO, L, SING).
	DJAMBI:	Simpang, *bb13107* (BO).
	PALEMBANG:	Rawas, *Dumas 1617* (BO, L); Bajung Lintjir, Banjuasin & Kubestreken, *TIP724* (BO).
	BANKA:	K. Gadung, *bb10570* (BO); Blinju, *Grashoff 101* (BO, L).
	BILLITON:	*van Rossum 63* (BO, CAL, K, L).
	RIOUW ARCHIPELAGO:	P. Karimon, Paralabu, *bb20376* (A, BO, K, L, NY).
MALAY PENINSULA:		Perak, Malacca, Johore and Singapore. For list see Gard. Bull. Sing. 16 (1958) 288.

BORNEO WEST BORNEO: Kapuas, Sungei Ahas, *bb1200* (BO); Palo, *Becking 50* (BO).

EAST AND NORTH-EAST BORNEO: West Kutei, No. 44 near L. Djanan, *Endert 5063* (A, BO, K, L); West Kutei, *bb16738* (A, BO, L); West Kutei, Mt Palimasan near Tabang, Belajan River, *Kostermans 12800* (K, L); Central Kutei, Belajan River near Long Bleh, *Kostermans Nos. 10286* (K, L, SING) and *10359* (L, SING); Sungei Muan Region near Balikpapan, *Kostermans 4046* (BM, BO, K, L, P, PNH, SING).

BRITISH NORTH BORNEO: Sepilok, Papahat, Sungei Arang, *Kadir A934* (BO, CANB, K, KEP, SAN, SING).

PULAU NUNUKAN: *bb Nos. 26188* (BO, L); *29300* (BO, L, SING); *29340* (BO, K, L) and *29356* (A, BO, K, L, P, SING); northern part, *Kostermans Nos. 8634* (BO, K, L, P, SING); *8662* (BO, K, L, P, SING); *8686* (BO, K, L, SING); *8772* (BM, BO, K, L); *8934* (BO, K, L); *9017* (BO, K, L); *9059* (BO, L) and *9130* (BO, K, L); *Meijer 1874* (L); *Paymans Nos. 1* (L); *2* (BO, K, L, SING); *61* (BO, L); *74* (BO, L); *127* (L); *Sutan Pennek 101* (BO, L).

DISTRIBUTION: Sumatra, Banka, Billiton, Riouw Archipelago, Malay Peninsula and Borneo.

TYPE MATERIAL: *Myristica conferta* King, *King Nos. 6211* (CAL, FI, G, K, L) and *10295* (CAL, K, SING); *Wray 2377* (CAL, K, SING); *Griffith 4345* (A, CAL, K); *Maingay 1297* (CAL, K); *Ridley 442* (SING).

VERNACULAR NAMES: *Salak* (Billiton); *lipai* (Sumatra).

I have to exclude from this species var. *tonkinensis* Warb. Monog. Myrist. (1897) 581 as the two syntypes of it are *K. laurina* (see under that species). I must also exclude var. *borneensis* Warb. Monog. Myrist. (1897) 580. Not one of the syntypes quoted by Warburg for this variety can be identified with *conferta*. See note under *K. latericia* for their identifications. I have seen specimens from Upper Burma, Indo-China and Siam often wrongly named *conferta*. Some of these are *laurina* and others *erratica*. The former when sterile closely resembles *conferta* in its leaves and tomentum, but can be distinguished from *conferta* by the sunk veins on the upper surface of the leaf, best seen at the base of the leaf. The apical portions of the twigs are striate in *conferta* but not or seldom so in *laurina*. The second species *erratica* looks very similar to *conferta* since it has the same kind of striations, but the leaves

are usually narrower. The tomentum in *erratica* tends to disappear, however, except on the lower midrib, but some specimens have the lower surface of the leaves covered with it. *K. conferta* so far has not been found north of Perak.

(6) **Knema curtisii** (King) Warb. Monog. Myrist. (1897) 567 t. 25 f. 1–2; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 240; Ridley, Fl. Mal. Pen. 3 (1924) 69; Sinclair in Gard. Bull. Sing. 16 (1958) 281 f. 4.

Basionym: Myristica curtisii King in Ann. Roy. Bot. Gard. Calc. 3. (1891) 326 pl. 167.

Synonym: M. sp. Hk. f. Fl. Br. Ind. 5 (1886) 113; *Maingay 1301, foot note*—**Fig. 6.**

var. **curtisii**—**Fig. 6C.**

SUMATRA EAST COAST:	Sibolangit, ***Beumée 863*** (BO); *Fairchild 1046* (UC) and *Lörzing Nos. 4623* (BO, L, SING, U) and *10124* (BO, SING).
PALEMBANG:	Rawas, ***Forbes 3193*** (A, BM, CAL, K, L).
PULAU SIMALUR:	*Achmat Nos. 93* (BO, L, SING, U); *790* (BO, L, U); *927* (BO); *1152* (BO, L, SING, U); *1492* (G Boiss., L, SING) and *1803* (BO, K, L, P, SING, U, UC).
MALAY PENINSULA:	Kedah, Penang, Perak, Trengganu, Pahang, Negri Sembilan, Malacca, Johore. For list see Gard. Bull. Sing. 16 (1958) 281. New and first records for Selangor:—Bukit Lagong F.R., Kepong, *Kochummen K.F.N. 83403* (KEP); *Wyatt-Smith K.F.N. 52271* (KEP) and *Wyatt-Smith s.n. date 1948* (KEP).
BORNEO SARAWAK:	Upper Rejang River, *Clemens Nos. 21207* (K, NY, SAR) and *21208* (A, BO, K, M, NY, SAR); Bukit Pendam, *Daud & Tachun S.F.N. 35739* (A, B, E, K, L, SAR, SING); 3rd Division, Kapit District, Belaga subdistrict, left bank of Rejang River, 10 km. below Belaga near airfield, *M. Jacobs 5223* (CANB, L, SAR).
BRUNEI:	Bukit Biang, *P. S. Ashton BRUN 5587* (SING).
WEST BORNEO:	Amai Ambit, *Hallier 3358* (BO, SING).
EAST AND NORTH-EAST BORNEO:	Müller Range (Bukit Batu Milier), *Amdjah 141* (BO) and *Jaheri 354* (BO); Gunong Labang, *Amdjah 204* (BO, SING); West Kutei, *Endert 2586* (A, BO, K, L); No. 29, L. Liah Leng, West Kutei, *Endert Nos. 3018* (BO, L) and *3062* (BO).

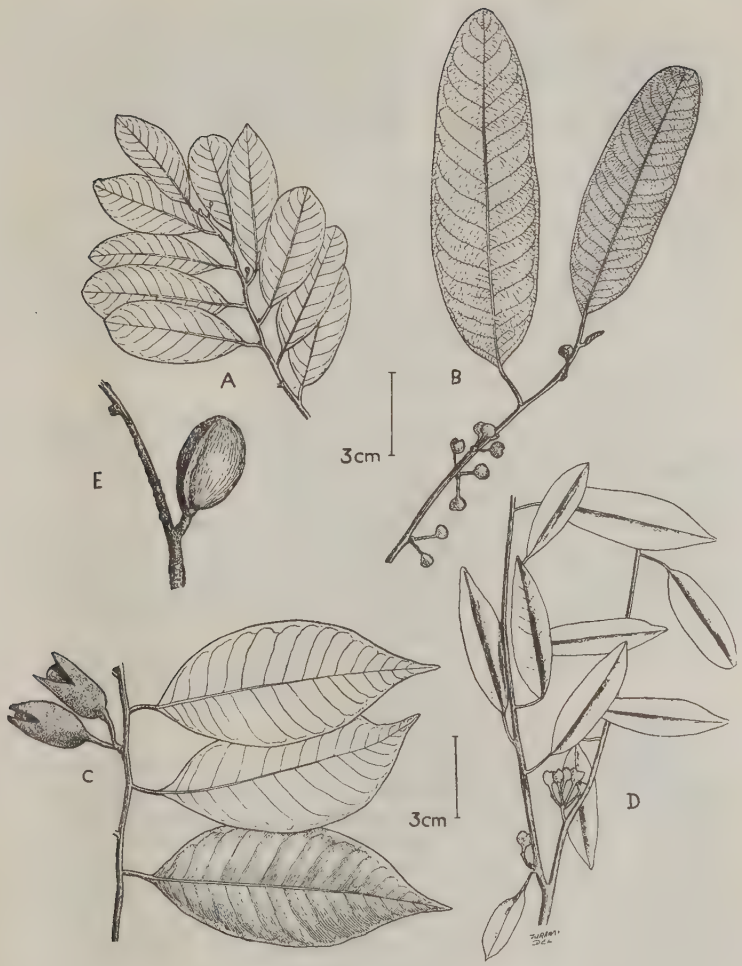


Fig. 6. *Knema curtisii* (King) Warb. with four of its varieties.

A, var. *paludosa* J. Sinclair, twig with leaves. E, the same with fruit. B, var. *linguiformis* J. Sinclair, twig with leaves and male flowers. C, var. *curtisii*, twig with leaves and fruit. D, var. *arenosa* J. Sinclair, twig with male flowers. A from *Corner S.F.N. 26155* (SING isotype). B from *Enggoh 10466* (L). C from *Curtis 1024* (SING syntype). D from *Kostermans 10194* (SING). E from *Corner 15:4:34* (SING).

PULAU TARAKAN: Amal-Path, *Meijer 2521* (BO, K, L) and *Meijer 2590a* (BO, K, L).

DISTRIBUTION: Sumatra, Malay Peninsula, Borneo.

TYPE MATERIAL: *Myristica curtisii* King, *Curtis 1024* (CAL, K, SING) and *1320* (K, SING); *Scortechini 292b* (CAL, FI, G, K, L, SING); *Wray 2112* (CAL, K, SING) and *Maingay 1301* (CAL, K, L).

VERNACULAR NAMES: *Bengkiring* (Sumatra).

There are 20–25 anthers in *K. curtisii* and not 30–45 as stated by previous investigators including myself. The number of anthers in certain species of *Horsfieldia* and *Myristica* has often been miscounted and here in this *Knema* the appearance of the anthers is also deceptive, each pollen sac looking like two instead of only one, due to their close proximity in unopened flowers.

var. **amoena** J. Sinclair, **var. nov.—Fig. 7.**

A typo foliis liguliformibus angustissimis, marginibus fere parallelis, nervis et reticulationibus indistinctis; a var. *arenosa* foliis magis coriaceis, apice obtusis, et a var. *paludosa* foliis longioribus angustioribus differt.

Arbor 18 m. alta. *Cortex* pallido-griseus, levis; latex roseus exilis. *Folia* coriacea, supra modice viridia nitida (in sicco nigro-brunnea) subtus glauca, ligulata, apice obtusa, basi acuta, 5–8 cm. longa, 1–1.8 cm. lata; petioli 7 mm. –1 cm. longi, graciles. *Flores masculi* intus pallido-flavi. *Fructus* ignotus.

BORNEO BRUNEI: Andulau Forest Reserve (west), *Sinclair 10442* (A, B, BM, BO, E, K holotype, L, M, NY, SAR, SING).

DISTRIBUTION: Borneo (Brunei).

The leaves of this variety resemble those of var. *arenosa* in being long and narrow, but differ as they are more coriaceous, obtuse at the apex and dry a dark brown above instead of green. They are also longer and different in shape from those of var. *paludosa* and with nearly parallel sides, but agree in having an obtuse apex and the same colour on drying. The veins and reticulations are indistinct or invisible. The flowers are fragrant when crushed and of a cream colour inside when fully open.

var. **arenosa** J. Sinclair, **var. nov.—Fig. 6D.**

Synonym: Myristica lanceolata Msc. Herb. Korthals, *nom. nud.* in *sched.* (non *M. lanceolata* Wall.)

A typo foliis multo minoribus, lanceolatis, nervis supra invisibilibus subtus tenuissimis vel inconspicuis, reticulationibus utrinque fere invisibilibus differt.

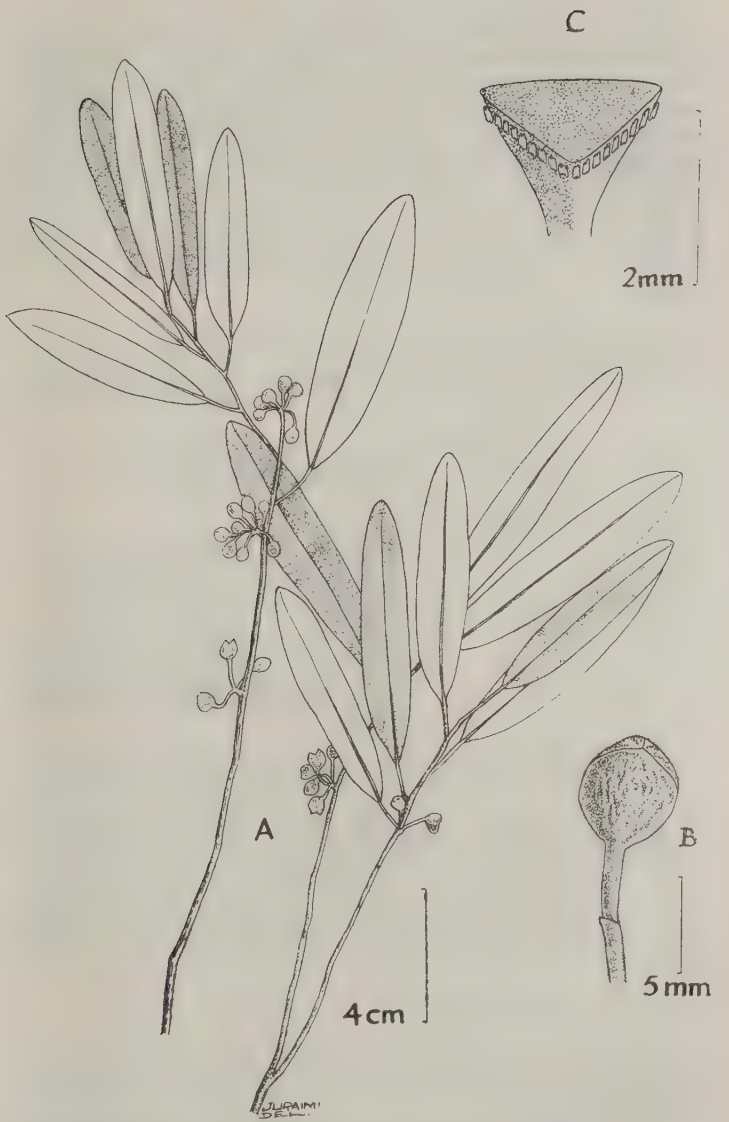


Fig. 7. ***Knema curtisii*** **(King) Warb. var.** ***amoena*** **J. Sinclair.**
A. twig with leaves and male flowers. B, male flower enlarged. C. staminal column. All from ***Sinclair*** *10442* (SING).

Tree 6–15 m. high. *Bark* smooth, with very small dents here and there, pale brown or straw-coloured; sap dark red, copious. *Leaves* chartaceous or dark green above, glaucous beneath, lanceolate with nearly parallel sides, apex acute or bluntly acute, base acute; nerves not visible above, very fine and faint beneath; reticulations almost invisible on both surfaces, seen only on the lower surface with a lens; length 2.5–7 cm., average 5 cm.; breadth 8 mm. –2.3 cm., average 1–1.5 cm.; petioles very slender, 5–8 mm. long. *Male flowers* rusty-tomentulose, fragrant when crushed, 3–4 mm. long, pedicels 8 mm. –1 cm. long with a minute median bracteole.

SUMATRA MENTAWAI ISLANDS:	Pulau Siberut, Tibokbongi, *bb17487* (BO).
BORNEO SARAWAK:	Semengoh F.R., Kuching, *Sinclair 10183* (A, B, E, K, L, M, NY, SAR, SING).
SOUTH AND SOUTH-EAST BORNEO:	Sakumbang, *Korthals (99)* (L) as *M. lanceolata* Korthals nom. nud.
EAST AND NORTH-EAST BORNEO:	Tidungsche Landen, *bb18174* (A, BO, L, SING); Mentawir, Balikpapan, *Kostermans 9764* (BO, K, L, P, SING); Loa Djanan, East Kutei, *Kostermans 8653* (BM, BO, K, L, P, SING); and *Kostermans 10194* (BO, K, L, PNH, SING); Tepian Lobang, East Kutei, *bb14646* (BO, L); Sangkulirang Island, *Kostermans 4927* (BM, BO, K, L, P, PNH, SING).
PULAU NUNUKAN:	Northern part, *Kostermans 8653* (BM, BO, K, L, P, SING) and *Zainal Abidin 21* (BO, L) = *bb34623*.
DISTRIBUTION:	Sumatra (Pulau Siberut) and Borneo.
TYPE MATERIAL:	*Kostermans 8653* (BM, BO, K holotype, L, P, SING).

A variety with uniformly small chartaceous leaves from sandy ridges. The nerves and reticulations of the leaf are not or scarcely visible.

var. **linguiformis** J. Sinclair, **var. nov.—Fig. 6B.**

A typo foliis magis coriaceis, oblongis cum marginibus fere parallelis, apicibus linguiformibus, reticulationibus utrinque distinctis differt.

Tree 10–15 m. high. *Bark* greyish-brown, thin, almost smooth; sap copious, pink. *Leaves* medium green and glossy above, glaucous beneath, mostly oblong, sometimes lanceolate, apex bluntly acute

or obtuse, base acute or rounded; reticulations distinct on both surfaces; length 9–14 cm.; breadth 3–5 cm.; petioles 1 cm. long. *Male* and *female flowers* rusty-tomentulose outside, pink inside. *Male flowers* 5 mm. long and 6 mm. broad (not yet open) with 19–25 anthers, average number 20; pedicels 8 mm. long. *Female flowers* 5 mm. in diam., with a tomentose ovary and a 4–6-lobed stigma; pedicels 8 mm. long, stouter than in the male. *Fruit* not seen.

BORNEO SOUTH AND SOUTH-EAST BORNEO:	Sampit Region near Kuala Kuajan, *Kostermans 7942* (K, L, P, SING).
EAST AND NORTH-EAST BORNEO:	Gunong Moeara-Tagel, *Amdjah 144* (BO, K, L, SING); West Kutei, No. 37 near Mt. Kemvel, *Endert 3559* (A, BO, K, L).
BRITISH NORTH BORNEO:	Kabili F.R., *Agama 3990* (K, L, SAN); Kabili-Sepilok F.R., *Castro 7275* (BO, K, L, PNH, SING); ditto cpt. 15, *Enggoh 10466* (K, KEP, L); Sepilok F.R., cpt. 16, *Sinclair 9294* (A, B, BM, E, K, L, M, SAN, SING) and cpt. 14, *Wood SAN 16322* (K, KEP, L, SAN, SING); Gurulau, Upper Kinabalu, *Clemens 50432* (A, K, L, LE).
DISTRIBUTION:	Borneo except Sarawak, Brunei and West Borneo.
TYPE MATERIAL:	*Sinclair 9294* (A, B, BM, E, K holotype, L, M, SAN, SING).

When I first made acquaintance with this plant I intended to give it the rank of a species and to place it next to *Knema curtisii*. Later, after I had seen all the material of *curtisii* including its other varieties, it seemed reasonable that the plant in question could only rank as yet another variety of the somewhat polymorphic *curtisii*. The leaves of var. *linguiformis* are more coriaceous and different in shape (never elliptic) from those of typical *curtisii*, the sides being nearly parallel and the reticulations more distinct. The leaf base is often rounded and the apex obtuse or less acute.

var. **paludosa** J. Sinclair, **var. nov.—Fig. 6A & E.**

A typo foliis minoribus, elliptico-lanceolatis vel obovatis, apicibus obtusis, fructibus maioribus, stipitibus crassioribus differt.

Tree 12–18 m. high with a few stilt roots. *Bark* greyish-yellow, smooth; sap pale red, scant. *Leaves* variable in size, but smaller than in the typical form, elliptic-lanceolate to obovate, base acute,

apex obtuse, less often bluntly acute; nerves very faint or not visible above, slender beneath; reticulations faint on both surfaces; length 4–8 cm., average 4–5 cm.; breadth 1.5–4.5 cm., average 2.5 cm.; petioles 5 mm. –1 cm. long. *Fruit* apricot-yellow, ridged on the line of suture, ellipsoid, 4–5 cm. long and 2.5–3 cm. broad; stalk 1 cm. long, thicker than that of the typical, 4 mm. thick. *Aril* deep rose-carmine to rose-crimson.

SUMATRA TAPANULI:	Pulau Poene, Sibolga, *bb3770* (BO).
PALEMBANG:	Bajunglintjir, Banjuasin & Kubestreken, *Dorst TIP751* (BO).
MALAY PENINSULA JOHORE:	Kampong Hubong, Endau, *Kadim 287* (A, B, BM, E, K, L, SING).
SINGAPORE:	Jurong, *Corner S.F.N. 26155* (BO, CAL, K, SING) a swamp now drained and trees cut down; Mandai Road, *Corner, 15th April, 1934* (SING) and *Kiah S.F. Nos. 37123* (A, BO, KEP, SING) and *37148* (A, BM, BO, BRI, K, KEP, SING); Bukit Mandai, *Goodenough 3376* (CAL, K, SING).
BORNEO SARAWAK:	Lundu, *Clemens 22291* (A, BO, K, NY, SAR).
DISTRIBUTION:	Sumatra, Singapore, Sarawak.
TYPE MATERIAL:	*Corner 26155* (BO, CAL, K holotype, SING).

VERNACULAR NAMES: *Budjang lalu* (Sumatra).

This is a fresh water swamp forest form distinguished from the typical by the presence of stilt roots, smaller, obtuse leaves and a larger fruit with a thicker fruit-stalk, the latter 4 mm. thick as against 1.5–2 mm. thick in typical *curtisii*. The Singapore specimens were formerly all included by me in *K. curtisii* [Gard. Bull. Sing. 16 (1958) 283] where I pointed out that they were slightly different from the typical. Unfortunately the swamp at Jurong has now been drained and the trees there cut down. I have looked for this variety at Mandai Forest myself, but so far have failed to find it. If it still exists, the tree is certainly very rare in Singapore now. One ought to search for it in the swamp forests of South Johore at Kuala Sedili and along the Kota Tinggi-Mersing Road for more records. I have just received a recent record of it from felled, fresh water swamp forest at Endau, N.E. Johore.

(7) **Knema elmeri** Merr. in Univ. Calif. Publ. Bot. 15 (1929) 75. —**Fig. 8.**

Tree 8–15 m. high with a rounded crown. *Bark* greyish-brown, flaking; sap red, watery, copious. *Twigs* with greyish-brown bark which tends to crack and peel off, angled and rusty-pubescent at the apex, glabrous lower down. *Leaves* chartaceous or thinly

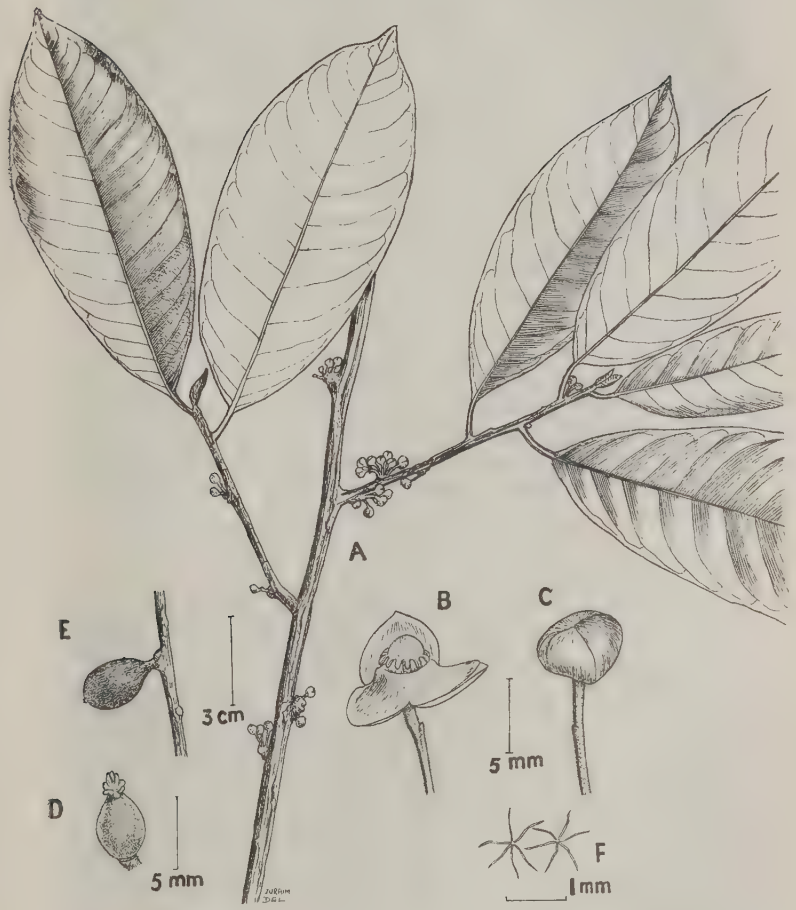


Fig. 8. *Knema elmeri* Merr.

A, twig with leaves and male flowers. B–C, male flowers enlarged. D, ovary and stigmas. E, fruit, F, scales from lower leaf-surface. A from *Elmer 21042* (A). B–C from *Sinclair 9311* (SING). D from *Sinclair 9299* (SING). E–F from *Wood & Kilang SAN 16643* (SING).

coriaceous, dark green above and glossy, densely tomentulose with silvery or pale brownish, stellate scales beneath, oblong or oblong-elliptic, apex acute, sometimes slightly blunt, base acute or less often slightly rounded; midrib raised on both surfaces, except at the base on the upper; nerves 15–20 pairs, slender and slightly raised above, prominent beneath where they are brown when dry, curving gradually, line of interarching rather faint; reticulations close but faint, being obscured by the white indumentum on the lower surface; length 12–22–(26) cm.; breadth 5–8.5 cm.; petiole 1–1.5 cm. long, puberulous. *Male flowers* pale brown-tomentulose outside, scarlet inside, 8–9 mm. across when expanded, 5 mm. in diam. in bud, lobes ovate, acute, thickened at the centre; pedicels 5–7 mm. long with a minute, median bracteole; staminal disc convex like an opened umbrella, pink on a 0.5 mm. long stalk; anthers yellow, 10–12 (average 10), horizontal, well-spaced and not touching each other, oblong, sessile. *Female flowers* of the same colour as the male, 6 mm. in diam. in bud, sessile or on a 1 mm. long pedicel; ovary ovoid, rusty-tomentose, 3 mm. long, stigma with about 8 lobes (bifid and each lobe again divided into 4). *Fruit* oblong or obovoid-ellipsoid, rusty-tomentulose, 2.5 cm. long and 1.2 cm. broad; stalk very short, 2–5 mm. long. *Testa* pale brown.

BORNEO BRUNEI: Ulu Supon, Tutong, *Ashton BRUN 865* (BRUN, SAR, SING).

BRITISH NORTH BORNEO: S.l., *Agama 419* (A, BM, BO, K, P, US); Tawau, *Elmer Nos. 21042* (A, BM, BO, BR, C, G, K, L, M, NY, P, S, SING, U, UC) and *21527* (A, BM, BO, BR, C, G, K, L, M, NY, P, PNH, SING, U, UC); Sub-cpt. 16, Cpt. 2, Bombay T.C. Concession, Kalabakan, 30 mls. W.N.W. of Tawau, *Wood A4139* (KEP, L, SAN, SING); Cpt. 14, Sepilok F.R., *Sinclair 9311* (K, L, SAN, SING); Cpt. 15, Sepilok F.R., *Sinclair 9299* (E, K, L, SAN, SING); Bettotan, Sandakan, *Puasa 4587* (BO, K, L, PNH, SING); N. slopes of Bukit Batangan, 5 mls. S. of Malaman, Sipitang, *Wood & Kilang SAN 16643* (KEP, L, SAN, SING).

PULAU NUNUKAN: *Meijer 2327* (BO, L); Mara, Bulungan, *bb10756* (BO).

DISTRIBUTION: Borneo (Brunei, British North Borneo and P. Nunukan).

TYPE MATERIAL: *Elmer 21527* (A, BM, BO, BR, C, G, K, L, M, NY, P, PNH, SING, U, UC holotype).

A small tree of lowland forest, striking and beautiful from the white, silvery appearance of the undersurface of the leaves. It must be placed along with *K. hookeriana, furfuracea* and *latericia* on account of the bark of the trunk and twigs tending to crack and scale off, the sessile anthers, the numerous stigma lobes and the median bracteole of the pedicel. It is nearest to *K. latericia,* the leaves being of about the same size, but it differs in the convex staminal disc, the shorter tomentum of the fruit and above all in the silvery lower surface of the leaves.

(8) **Knema erratica** (Hk. f. et Th.) J. Sinclair, **comb. nov.**

Basionym: Myristica erratica Hk. f. et Th. Fl. Ind. (1855) 156; A.DC. Prodr. 14 (1856) 205; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 323 pl. 162.

Synonyms: M. longifolia Wall. ex Bl. var. *erratica* (Hk. f. et Th.) Hk. f. et. Th. Fl. Br. Ind. 5 (1886) 110. *Knema siamensis* Warb. in Fedde, Repert. 16 (1919) 254—**syn. nov.** *M. angustifolia* Roxb., sensu Kanjilal, Fl. Assam 4 (1940) 45. *K. yunnanensis* H. H. Hu in J. Roy. Hort. Soc. 63, 8 (1938) 387 in obs. sine descr. *nom. nud.;* Sinclair in Gard. Bull. Sing. 16 (1958) 328. *M. glaucescens* (Jack) Hk. f. et Th., sensu Kanjilal, Fl. Assam 4 (1940) 45 quoad sp. Sibsagar.—**Fig. 9.**

Tree 20 m. high. *Bark* greyish-brown with large thin flakes; sap copious, blood-red. *Twigs* with conspicuous striations and furrows right up to the pale, yellowish-brown, tomentose apex. *Leaves* thinly coriaceous, narrowly oblong or oblong-lanceolate, often with nearly parallel sides, apex acute or acuminate, base acute or rounded, glabrous and shining above, thinly covered with light brown stellate hairs beneath when young, later becoming glabrous except for the midrib or persisting; main nerves 20–30 pairs, fine and raised above, prominent beneath, reticulations forming a dense close network above (as in *K. conferta*), also visible beneath but somewhat obscured by tomentum; length 16–30 cm.; breadth 3–7 cm.; petiole 1–1.5 cm. long. *Male flowers* light brown-tomentose, obtusely triquetrous or sub-globose, split down to ½ way into the perianth lobes, 5 mm. in diam.; pedicels 7 mm. long with the bracteole median or above the middle; staminal disc flat with a short stipe; anthers 10–13, mostly 13 sessile (King says stalked). *Female flowers* with a bi-lobed stigma, each lobe again bi-lobed. *Fruit* solitary or in pairs, ellipsoid, 2.5 cm. long and 2 cm. broad, densely covered with stellate tomentum when young, the tomentum shedding later; stalk slender, striate, 5 mm. –1 cm. long. *Aril* scarlet, very thick.

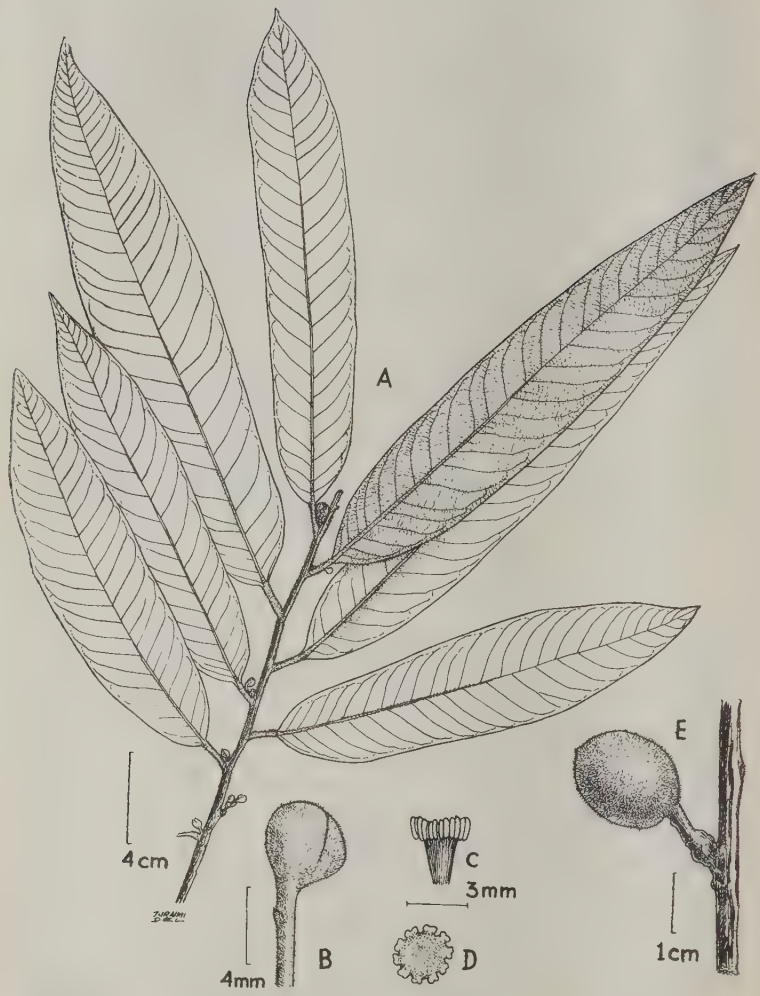


Fig. 9. *Knema erratica* (Hk. f. et Th.) J. Sinclair.

A, twig with leaves and male flowers. B, male flower enlarged. C–D, staminal column. E, fruit. All from *Hk. f. et Th. s.n.*, Khasia (A type material).

CHINA YUNNAN: Szemao (Menjhel), *Henry Nos. 11780* (E, K); *11780a* (E, K) and *11780b* (E, K); between Chieng Law and Muang Hun, *Rock 2384* (US).

INDIA EAST HIMALAYA: *Sikkim, King 2439* (CAL, K); *Hk. f. et Th. s.n.* (L).

ASSAM: S.l., *Simmons s.n.* (L); Khasi (Khasia), *Hk. f. et Th. s.n., 14th* and *19th Oct., 1850* (A, BM, BR, C, CAL, CGE, E, FI, G Prodr., K, L, LE, M, P, U, W); *Hk. f. et Th. 1040* (P); Umiau, Khasi, *Bor 18387* (DD); 37¼ miles past G.S. Road, Khasi, *Kanjilal 4050* (CAL); Khasi, *Mann s.n.* (CAL); Khasi & Jaintia Hills, *Bor 17838* (DD) and *Kanjilal 6275* (DD); Mikir Hills, *Simmons 704* (DD); Naga Hills, Daleswari forest, Cachar, *Mann 345* (CAL); Jirebhat, Manipur, *Clarke 42361* (FI); Nongjaibang, Manipur, *Clarke 42348* (BM, CAL, LE); near Fort Lungleh, S. Lushai Hills, *Gage 114* (CAL, DD, PDA).

EAST PAKISTAN: East Bengal, *Griffith 4347* (CAL, K, P).

BURMA: Nam Tamai Valley, Upper Burma, *Kingdon Ward 5534* (E); south-eastern Shan States, ridge between Muang Len and Meh Khong river basin, Keng Tung Territory, *Rock 2030* (A, UC, US).

SIAM SOUTH-EASTERN DIVISION: Ban Dom railhead, Sriracha Forest, *Collins 857* (BK); Nong Kaw, Sriracha Forest, *Collins 1939* (BK, BM); Cholburi, *F.D. 15188* (BK, F); Kao Saming, Krat (Trad) *Kerr 9383* (BK, BM); Dan Chumpon, Krat (Trad), *Kerr 17607* (BK, BM); Kaw Chang, river bank at Klong Son, Chantaburi (Chanṭabun), *Schmidt 690* (C).

DISTRIBUTION: China (Yunnan), India (East Himalaya, Assam, East Bengal) Burma, Siam.

TYPE MATERIAL: *M. erratica* Hk. f. et Th., Khasia, *Hk. f. et Th.* (A, BM, BR, C, CAL, CGE, E, FI, G Prodr., K holotype, L, LE, P, U, W). *K. siamensis* Warb., Kaw Chang, *Schmidt 690* (C) two sheets named *K. siamensis* in Warburg's hand-writing. In his publication he states collector as Schmidt but does not quote a number.

VERNACULAR NAMES: *Tezranga; mamui; mota-pasuti* (Assam); *bol-lanchi* (Garo); *bonsigejao* (Kach.); *dieng-soh lang-snan* (Khasi); *chekpulu-arong* (Mik); *indung* (Tipp).

I agree with Hooker f. and Thomson, A.DC. and King that this is a distinct species. Hooker f. and Thomson, however, in Flora British India reduced it to a variety of *M. longifolia*. Warburg did not consider it distinct, but made it a synonym of *K. angustifolia* (now *K. cinerea* var. *andamanica*) from which it differs in a number of characters (see below). It is one of two species reaching as far north as China (Yunnan) and at altitudes 2,000–5,000 ft., the other being *K. globularia*. It differs from var. *andamanica* in having stellate tomentum on the lower surface of the leaves. This tomentum is generally caducous except on the lower midrib and nerves, but it may also persist. The leaves have more veins and the reticulations are more distinct. The apices of the twigs are much more striate and the colour of the tomentum on the twigs and flowers much lighter than in var. *andamanica*. Further, the anthers are sessile and the stipe of the staminal disc is shorter. It also resembles *K. linifolia* and they both grow together in Assam and Burma, but differs from that species in several important characters. The flowers in *linifolia* are larger with more anthers, 14–18 as against 10–13 and the pedicels are longer. The shape of the flower is pyriform or obovate, not triquetrous or sub-globose. The bark of the trunk does not flake as in *erratica* and the leaves are broader, thicker in texture and generally cordate at the base. However, forms with leaves acute or rounded at the base do occur and sapling or young leaves may also be acute at the base. Some of these specimens look more like *erratica* and may present difficulties. Sterile specimens of *erratica* also look like *K. conferta* and *laurina*. The presence of striations on the twigs and the raised veins of the upper surface of the leaf will generally distinguish them from *laurina*. *K. conferta* has more anthers and does not occur north of Perak in Malaya (see notes under that species). I am unable to separate *K. siamensis* from *erratica*. *K. siamensis* occurs in a small pocket of the South Eastern Division of Siam. The distribution seems unusual, but Tem Smitinand points out in a paper "The Genus Dipterocarpus, Gaertn. in Thailand", Thai For. Bull. (Botany) 4 (1958) 5 that certain Burmese species such as *Hedera himalaica* and *Nyctocalos shanica* are also present here.

In the Journal of the Royal Horticultural Society 63, 8 (1938) 387, H. H. Hu mentions two new species of *Knema* from Yunnan. There is no description here although the two species *K. wangii* H. H. Hu and *K. yunnanensis* H. H. Hu were subsequently listed in the Kew Index. There are no later descriptions of them and consequently they are not validly published. I was able to find specimens of *K. wangii* in Kew and Paris, *Wang 80634* and see that this plant is identical with *K. globularia* (Lamk) Warb. As there is only one other species of *Knema* recorded from China,

namely *K. erratica*, I suspected that *K. yunnanensis* might be similar. Since I could not trace any specimens, I wrote to H. H. Hu at the Institute of Botany, Academia Sinica, Pekin who informs me that *K. yunnanensis* is indeed identical with *K. erratica*, but that it was not validly published. It is represented by *Wang 73168* from Tsang-Yuan Hsian and *Wang 78230* from Cheli both in South Yunnan.

(9) **Knema furfuracea** (Hk. f. et Th.) Warb. Monog. Myrist. (1897) 581 t. 24 f. 1–2; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 245; Ridley, Fl. Mal. Pen. 3 (1924) 70; Corner, Wayside Trees of Malaya 1 (1940 & 1952 editions) 476; Sinclair in Gard. Bull. Sing. 16 (1958) 275 f. 2 & Pl. IB.

Basionym: Myristica furfuracea Hk. f. et Th. Fl. Ind. 1 (1855) 159 [non A.DC., Prodr. 14, 1 (1856) 206 = *K. plumulosa*]; Miq. Fl. Ind. Bat. 1, 2 (1858) 70; Hk. f. Fl. Br. Ind. 5 (1886) 112; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 318 pl. 155.

Synonyms: Myristica longifolia Wall. ex Bl. sensu Hk. f. et Th. Fl. Ind. 1 (1855) 156 quoad sp. Penins. Malayanae tantum. *M. furfuracea* Hk. f. et Th. var. *major* King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 319 pl. 155 f. 6. *K. pierrei* Warb. Monog. Myrist. (1897) 585; Lecomte in Not. Syst. 1, 4 (1909) 101 et in Flore Gén. de L'Indo-Chine 5, 2 (1914) 105—**syn. nov.** *M. dongnaiensis* Pierre Msc. *nom. nudum.*

INDO-CHINA CENTRAL VIETNAM (ANNAM): Now de Niulhoa, Prov. Nhatrang, *Poilane 6335* (P, SING); Massif de la Mère et l'Enfant, Prov. Nhatrang, *Poilane 6663* (P, SING).

SOUTH VIETNAM (COCHIN-CHINA): Trangboum, *Chevalier Nos. 36744* (P) and *36762* (P); Mt Lu, Bienhoa, *Pierre 1627* (BM, BO, BRI, CAL, E. G and Boiss., K, P, SING).

SIAM NORTHERN DIVISION: Chiengmai, Doi Chiangdao, *Kerr 5621* (BK, BM) and *Smitinand 2720* (SING); Wieng Papao, *Kerr 2518* (BM); Muang Fang, *Kostermans 28* (BO, L).

PENINSULAR DIVISION: S.l., *Winit F.D. 15195* (SING).

SUMATRA S.L.: *Batten-Pool, date 1939* (SING).

EAST COAST: Langkat, Si Sedapan, *bb9366* (BO).

PALEMBANG: Batu Pantjeh, R. Moesi, *Forbes 2694* (BM, K, L, LE); Ogan Ulu, *Teijsmann 3745* (BO, CAL, U).

LAMPONG:	Gunong Rati, Beremong, *Iboet 159* (BO, L).
RIOUW ARCHIPELAGO:	Tanjong Pinang, *Teijsmann s.n.* (BO, L).
MALAY PENINSULA:	All provinces except Perlis, and Prov. Wellesley. For list see Gard. Bull. Sing. 16 (1958) 277. New and first record for Kelantan:—Kampong Gobek, Kerilla Estate *Mohd Shah & Kadim 536* (K, L, SING). Other records Perak, Pulau Jarak, *Wyatt-Smith K.F.N. 71085* (KEP); Pulau Rumbia, *Wyatt-Smith 51* (KEP).
BORNEO SARAWAK:	Telok Asam, Bako National Park, *Purseglove 5047* (A, K, L, NY, SAR, SING).
BRUNEI:	Bukit Teraja, *Anderson SAR 2047* (BRUN, SAR); 1¼ mile, Bangar-Batu Apoi Road, *Ashton, Smythies & Wood SAN 17111* (BRUN, K, L, SING); north slopes of Bukit Patoi, *Ashton, Smythies & Wood SAN 17402* (K, L, SING); Cpt. 5, Andulau F.R., Kuala Belait, *Ashton, Smythies & Wood SAN 17504* (K, L, SING).
BRITISH NORTH BORNEO:	Cpt. 13, Sepilok F.R., *Wood SAN 15430* (BO, L, SAN, SING); Leila F.R., Elopura, *Majuyap 55250* (SAN); Bettotan, Sandakan, *Kloss S.F.N. 19066* (BO, K, NY, SING, UC).
LABUAN:	*Low, date 1867, FI acc Nos. 7787; 7787A; 7787B* and *7787C* all (FI).
ANAMBA ISLANDS:	Near Terempak, Siantan, *Henderson S.F.N. 20250* (BO, K, SING); Gunong Adang, Jemaja, *Henderson 20372* (BM, BO, SING, UC).
P. NUNUKAN:	*Kostermans 10713* (BO, L).
P. TARAKAN:	Amal-path, *W. Meijer 2533* (BO, K, L, SING).
DISTRIBUTION:	Indo-China, Siam, Sumatra, Malay Peninsula, Riouw Archipelago and Borneo except South and South-East Borneo.
TYPE MATERIAL:	*M. furfuracea* Hk. f. et Th., Herb. Hook., no data, collector *Porter* or *Wallich* (A, K holotype). *M. furfuracea* var. *major* King, *King Nos. 5600; 5720; 6059; 7551* and *10349* and *Curtis* Nos. *14509* and *2456*, for distribution see Gard. Bull. Sing. 16 (1958) 277. *K. pierrei* Warb. = (*M. dongnaiensis* Pierre Msc.) *Pierre 1627* (BM, BO, BRI, CAL, E, G and Boiss., K, P, SING).
VERNACULAR NAMES:	Muang luat (Siam).

I cannot separate *K. pierrei* Warb. from *furfuracea* so have reduced it. Warburg says it is very near to *furfuracea*. *K. furfuracea* is somewhat variable in the size of its leaves but that can be expected as it has a wide distribution.

(10) **Knema galeata** J. Sinclair **sp. nov.—Fig. 10.**

Aspectu ramulorum et foliorum, antheris sessilibus bracteolo mediano, haec species *K. furfuraceae* proxima, sed foliis basi non cordatis, ramulis prope apicem levibus atro-rubro-brunneis non decorticantibus, floribus masculis mitriformibus, extus pallidioribus, pedicellis longioribus differt. *K. mandaharan* foliis huic simillima, sed inter alia ramulis non fissis, pedicellis masculis multo brevioribus, bracteolis basalibus floribus obovoideis sat dissimillima.

Arbor 12–20 m. alta. *Cortex* extus griseo-brunneus, scabriusculus, abscidens, intus rubro-brunneus; latex ruber. *Ramuli* apice ferrugineo-furfuracei 4–7 mm. crassi, 3–4 cm. infra apicem leves atro-rubro-brunnei, in partibus vetustioribus decorticantes, griseo-brunnei. *Folia* rigido-coriacea, angusto-oblonga vel oblongo-lanceolata, marginibus parallelis, supra atro-viridia nitida, subtus leviter glauca, juniora excepta glabra, apice acuta, basi rotundata non cordata, 20–44 cm. longa, 5–8 cm. lata; costa utrinque elevata; nervi 20–32-jugati paralleli utrinque prominentes; reticulationes supra tenuissimae, subtus satis distinctae; petioli 1.8–2.5 cm. longi, 6 mm. crassi. *Flores masculi* ex tuberculis crassis lignosis 1–1.3 cm. longis orti; perianthium rigidum mitriforme cum angulis acutis, ex annulo crasso basali in tres lobos divisum, extus ferrugineo-tomentosum, intus roseum, 7 mm. longum, 1 cm. latum; pedicelli 2–2.3 cm. longi, medio bracteolati; discus staminalis rotundus, leviter convexus, stipitatus, 18–20 antheris sessilibus coronatus. *Fructus* ellipsoideus, 2–2.5 cm. longus, 1.5 cm. latus, furfuraceo-tomentosus, pilis dendroideis deciduis tectus, apice cum ± 10 lobis stigmatibus saepe persistentibus; stipes 7 mm. –1 cm. longus.

Tree 12–20 m. high. *Bark* greyish-brown, slightly rough and flaking; inner bark reddish-brown; sap red. *Twigs* stout, 4–7 mm. thick at the rusty-furfuraceous apex, smooth and dark reddish-brown, 3–4 cm. below the apex, greyish-brown and tending to crack in the older parts. *Leaves* stoutly coriaceous, narrow-oblong or oblong-lanceolate with parallel sides, dark green and glossy above, with whitish green midrib, glaucous beneath, with yellowish green midrib and veins, glabrous except when very young, apex acute, base rounded but not cordate; midrib raised on both surfaces; nerves 20–32 pairs, parallel and raised on both surfaces; reticulations fine above, more distinct beneath; length 20–44 cm., breadth

Fig. 10. *Knema galeata* J. Sinclair.

A, twig with leaves. B, male flowers, mature. C, male flower. D, staminal column. E, male flowers, immature. F, fruit. G, seed. H, apex of fruit enlarged, showing hairs and stigmatic lobes. I, female flowers. J, female flower enlarged. K, ovary and stigma. A–D from *Hassan SAR 4855* (SAR holotype). E from *Kostermans 7062* (BO). F–H from *Ladi s.n.*, Sungei Liang (SING). I–J from *Ladi, 27:2:1961,* Ulu Lumut (SING).

5–8 cm.; petiole 1.8–2.5 cm. long and 6 mm. thick. *Male flowers* on stout, woody, 1–1.3 cm. long protuberances; perianth rigid, mitriform in bud with acute angles, divided into 3 lobes to the base where there is a thickened annulus inside, rusty-tomentose outside, pink inside, 7 mm. long and 1 cm. broad; pedicels 2–2.3 cm. long, with a median bracteole; staminal disc circular, slightly convex, stalked, resting on the annulus; anthers sessile, 18-20. *Female flowers* 8 mm.–1 cm. in diam., their stalks shorter than in the male, 7 mm. –1 cm. long; ovary densely tomentose, 5 mm. in diam. with a bi-lobed stigma, each lobe again divided into 4–5 laciniations. *Fruit* ellipsoid, 2–2.5 cm. long and 1.5 cm. broad, furfuraceous-tomentose with dendroid hairs, becoming glabrous when very old, the stigma lobes, about 10 in number, often persisting at the apex; stalk 7 mm. –1 cm. long.

BORNEO SARAWAK:	Semengoh F.R., Kuching, *Yakup SAR 8914* (BO, K, L, SING) and *Sinclair Nos. 10189* (A, B, E, K, L, NY, SAR, SING) and *10301* (A, E, K, L, SING).
BRUNEI:	Berakas F.R., *Anderson (Md. Hasan) SAR 4855* (BRUN, KEP, SAR, SING); *Ashton BRUN 945* (BRUN, SAR, SING); *Sinclair Nos. 10546* (E, K, L, SAR, SING) and *10547* (A, E, K, L, SAR, SING); Bukit Puan, *Ashton & Whitmore BRUN 636* (BO, K, L, SAR, SING); Sungei Liang, Kampong Gana, Belait, *Ladi anak Bikas s.n.* (E, K, L, SING) fruit; Ulu Lumut, *Ladi, 27th Feb., 1961* (A, BM, E, K, L, SING) female flowers; Tutong, *Brünig SAR 1177* (SAR, SING).
EAST AND NORTH-EAST BORNEO:	West Kutei, No. 19 L Puhus, *Endert 4824* (BO, K, L); East Kutei, S. Bai, *bb13019* (BO, SING); Tanjong Bangko Region, north of Mahakan River, *Kostermans 7062* (BO, K, L, PNH, SING); Sg. Wain, Balikpapan, *Kostermans 4094* (BO, K, L, SING).
BRITISH NORTH BORNEO:	Cpt. 14 Kabili F.R., *Onggib 49055 (10281)* (K, KEP).
DISTRIBUTION:	Borneo in sandy forests.
TYPE MATERIAL:	*Anderson (Md. Hasan) SAR 4855* (BRUN, KEP, SAR holotype, SING).

This species is nearest to *K. furfuracea* but can be distinguished from it when sterile by the leaves not being cordate at the base. The bark on the twigs of both tends to crack but this process

starts much nearer the apex in *furfuracea.* Below the extreme rusty-furfuraceous apex in *K. galeata* is a smooth dark reddish-brown portion, but in *furfuracea* this portion has some tomentum and already shows fissures. Only the older thicker portions in *galeata* show the fissures. *K. galeata* is further distinguished by its much longer male pedicels, 1.8–2.5 cm. as against 7 mm. –1 cm. long in the other species. Along with *K. hookeriana* and *K. retusa* it has the longest male pedicels in the genus. The large male flowers are mitriform in mature bud and this character alone will distinguish it from all other *Knema* species. When very young the mitriform character is less or not apparent. The tomentum on the perianth is of a darker colour, and the anthers too, are more numerous than in *furfuracea,* 18–20 as against 10–13.

The leaves look almost exactly the same as those of *K. mandaharan* and often they cannot be distinguished from it. The leaves of *mandaharan* however, tend to have fewer veins and occasionally are slightly cordate at the base but never so deeply cordate as in *K. furfuracea.* The reticulations of the upper leaf surface in *mandaharan* tend to be more distinct in specimens from higher altitudes. The bark of the twigs does not show any tendency to crack so sterile material of *mandaharan* can be distinguished from *galeata* which has fissured bark on the twigs. The flower of *mandaharan* with the very short pedicel is quite different.

(11) **Knema globularia** (Lamk) Warb. Monog. Myrist. (1897) 601; Sinclair in Gard. Bull. Sing. 16 (1958) 325 f. 18.

Basionym: Myristica globularia Lamk. Mém. Ac. Paris (1788) 162 (non. Bl. in Rumphia).

Synonyms: K. corticosa Lour. Fl. Cochinch. (1790) 742 [incld. var. *tonkinensis* Warb.] Warb. Mong. Myrist. (1897) 593 t. 25 f. 1–4; Lecomte in Not. Syst. 1, 4 (1909) 101; Lecomte, Fl. Gén. de L'Indo-Chine 5 (1941) 105 f. 10 (14); Merr. in Trans. Amer. Phil. Soc. 24, 2 (1935) 163. *K. bicolor* Raf. Sylva Tellur (1838) 137—**syn. nov.** *K. missionis* (King) Warb. Monog. Myrist (1897) 602 t. 24 f. 1–3; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 247; Ridley, Fl. Mal. Pen. 3 (1924) 71; Corner, Wayside Trees of Malaya 1 (1940 & 1952 editions) 477 text f. 159 & 161. *K. wangii* H. H. Hu in J. Roy. Hort. Soc. 63, 8 (1938) 387 in obs. sine descr. nom. nudum. *K. sphaerula* (Hk. f.) Airy Shaw in Kew Bull. (1939) 545. *K. petelotii* Merr. in J. Arn. Arb. 23 (1942) 164. *Myristica lanceolata Wall. Cat. 6794* nom. nud. *M. corticosa* (Lour.) Hk. f. et Th. Fl. Ind. 1 (1855) 158 pro parte quoad spec. tennasserim., cochinch. et malayana tantum; A.DC. Prodr. 14, 1 (1856)

205 pro parte quoad spec. cochinch. et malayana tantum; Kurz, For. Fl. Br. Burma 2 (1877) 284 quoad sp. tenasserim. tantum. *M. glaucescens* (Jack) Hk. f. et Th. Fl. Ind. 1 (1855) 157 quoad spec. malayana (*Griffith* et *Cuming* 2315) tantum (non *M. glaucescens* Wall., *Wall. Cat. 6790=Tetranthera venulosa*); Hk. f. et Th. Fl. Br. Ind. 5 (1886) 111 pro parte quoad *Griffith 4344, Cuming 2315, Maingay 1282* et *Wallich 6788 & 6794* tantum. *M. chereevensis* Pierre nom. nud. in sched. *M. sphaerula* Hk. f. et. Th. Fl. Br. Ind. 5 (1890) 859. *M. missionis* King in Ann. Roy. Bot. Gard. Cal. 3 (1891) 321 pl. 158.

SINE LOC.: *Sonnerat* (C, G, P) not Java.

CHINA YUNNAN: Meng-la, Jenn-yeh Hsien, *C. W. Wang 80634* (K, P).

BURMA LOWER BURMA: Mt Popa, Rangoon, *Dickason 6813* (A); Tenasserim, *Beddome 101* (K) and *6728* (BM); Moulmein, *Falconer s.n.* (E, M, P, PDA); Mergui, *Griffith* (*Herb. Lemann*) *692* (CAL, CGE, K) and *s.n.* (DD, K) and s. coll. *422* (DD); Victoria Point, *P. Khant 11381* (DD) and *Parkinson 2065* (DD, K); Mayinnge River, *Parkinson 1995* (DD, K).

INDO-CHINA S.L.: *Pourret* [*Herb. Barbier*] (P).

NORTH VIETNAM (TONKIN): s.l., *Bon s.n.* (CAL, P); Kau Nga Shan, Tien Yen, *W. T. Tsang Nos. 27429* (A) and *27516* (A); Pho Lu, Prov. Laokay, *Poilane 25188* (P); West Tonkin, *Bon Nos. 307* (P); and *1540* (P); Dong Trung, West Tonkin, *Bon 5102* (P); West Tonkin, *Bon 6106* (P); Prov. Phu Tho, the following three:—Phu Ho, *Pételot 1546* (A, P, UC); Chan Mong, *Fleury 30114* (P); Trung Giap F.R., *Fleury 38000* (P, SING); Prov. Sontay, Tu Phap, *Balansa Nos. 1012* (BR, G and Boiss., K, P); *4196* (K, P); *4198* (BR. G and Boiss., K, L, LE, P) and *4199* (G) and *Pételot 2625* (A, TI); Da Chong, Prov. Sontay, *Pételot 5825* (A, BO, P); Mt Bavi, Prov. Sontay, *Pételot 6608* (A, TI); Minh Thai, *Bon Nos. 3182* (P); *3363* (K, P); *4142* (BO, P); *4210* (P) and *4332* (LE, P); Pont des Linhs, Prov. Vinh Yen, road to Tam Dao, *Pételot 5683* (A, P, US); Prov. Vinh Yen, Pont des Linhs, *Pételot 5375* (P, US); Linh Bam, *Pételot 5720* (A, P, US); South Tonkin, Yen Minh, *Bon 1435* (P); South Tonkin, *Bon 1643* (P).

CENTRAL VIETNAM (ANNAM): Prov. Nghe An, Co Ba Forest Reserve, *Fleury 30145* (P, SING); Hoi Xuan, Prov. Thanh Hoa, *Chevalier 37054* (P) and *Poilane 1741* (P, SING); Col No. 7, Prov. Vinh, *Poilane 20004* (P, SING); Bum Mo, *Hayata 376* (P); Massif de Dong Ché, Prov. Quang Tri, *Poilane 10486* (P); Mt Bana, *Clemens Nos. 3864* (A, BM, G, K, P, U, UC, US) and Bana, *Poilane 1581* (P); near Tourane, Bana, *Poilane 29203* (P, SING); Massif de la Mère et l'Enfant, Prov. Nhatrang, *Poilane Nos. 5128* (P, SING) and *6600* (P); Hue, *Clemens 4377* (A, BM, G, K, P, U, UC, US); Nui Bach Ma Station, near Hue, *Poilane 29919* (P); Tourane, *Chevalier Nos. 38438* (P) and *38566* (P); Thua Luu, Tourane, *Chevalier 38283* (P); near Tourane, Col des Nuages, *Poilane Nos. 7990* (P); *8073* (P) and *8079* (P).

SOUTH VIETNAM (COCHIN-CHINA): s.l., *Harmand Nos. 771* (BR) and *937* (BM); Can Danh, Tay Ninh, *Müller Nos. 898* (P) and *1002* (P, SING); Chon Thanh F.R., Prov. Thu Dau Mot, *Fleury Nos. 30009* (P) and *39348* (P); Prov. Thu Dau Mot, *Thorel 1154* (BM, CAL, K, P); the following five Prov. Bien Hoa: Buddhist temple, near Tan Huyen, *Pierre 260* (BM, BO, BR, CAL, E, G and Boiss., K, LE, P, SING); *Phung v. Dien 135* (P, SING); Chaudoc, *Pierre 5431* (BR, CAL, E, G and Boiss., P); *Loureiro s.n.* (BM); Arboretum of Trang Bom, *Dubourdieu* (*Chevalier*) *39179* (P); Me Khong Delta, *Harmand 602* (P) and s.n. (CAL, K, P); Pulau Condor (*Herb. Pierre*) de *Perry 260* (P); *Harmand s.n.* (BM, E, G, LE, P); *Nelson s.n.* (BM).

LAOS: Forest in neighbourhood of Savannakhet, *J. Vidal 1756* (P); neighbourhood of Vientiane, *J. Vidal 2250* (P).

CAMBODIA: s.l. *Hahn s.n.* (P); *Béjaud 665* (A, BO, P); road from Stung Treng to Kompong Speu, *Poilane 16297* (P); Bam Pe village, Chey Thvea, Kg Soai (= Kg Svai) *Béjaud 344* (P); Kralanh, Kompong Chnang, *Chevalier 36875* (P); between Pum Lovea and Pum Rong, Prov. Kg. Speu, *Poilane 17567* (P, SING); Tram Kok, *Müller 367* (P); Chereev, Prov.

Somrong Tong, *Pierre 5431* (BR, E, G and Boiss., P) several localities under this number and *Pierre 260;* Cam Chay, near Kampot, *Poilane 22854* (P, SING).

SIAM s.l.: *Schmidt 516* (C); *Winit 216* (BKF).

NORTHERN DIVISION: Ban Pasang between Ban Mehki and Ban Hueybong, route from Chiengrai to Chiensaen, Chiengmai, *Rock 1892* (A, E, UC, US); Nakawn Tai, Pitsanulok, *Kerr 5842* (BK, BM).

EASTERN DIVISION: Sangka, Surin, *Kerr 8311* (BK, BM); Surin, *Put Nos. 638* (BK, BM) and *669* (BK, BM); Chok Chai (= Katok) Korat, Nakawn Rachasima, *Kerr Nos. 8168* (BK, BM) and *8193* (BK, BM).

SOUTH-EASTERN DIVISION: Ban Pe, Rayawng, *Put 2751* (BK, BM); Makham, Chantabun (= Chantaburi) *F.D.C. 176* (SING); Makham, Chantaburi, *Chit 396* (BKF); Kao Sabap, Chantaburi, *Chit 354* (BKF); Makham, *Kerr 9553* (BK); Chantaburi, *Lakshnakara 440* (BK, BM); Kao Phra Baht, Chantaburi, *Lakshnakara 509* (BK, BM); jungle near Lem Dan, Trad (= Krad or Krat, *Schmidt 831* (C); Kao Saming, Trad, *Kerr 9430* (BK, BM); Dan Chumpon, Trad, *Kerr 17671* (BK, BM); Klawng Mayom, Kaw Chang, *Kerr 6863* (BK, BM); jungle at Klawng Salakpet, Kaw Chang, *Schmidt 880* (C); islet near Kaw Krahdaht, *Schmidt 581* (C); Sriracha Forest, Cholburi, *Collins Nos. 583* (US) and *817* (US); Sriracha Forest, Chak Yai, *Collins 1775* (BK, BM, US); Sriracha Forest, Nong Khum, Cholburi, *Collins 1941* (BK, BM, US).

CENTRAL DIVISION: Saraburi, *Chamruangsri F.D. 12120* (BKF); Phukae, Saraburi, *Smitinand 1545* (SING).

SOUTH-WESTERN DIVISION: Chumpawn, *Kerr 11650* (BK, BM).

PENINSULAR DIVISION: Ranawng, *Kerr 16599* (BK, BM); Kapor, Ranawng, *Kerr 16686* (BK, BM); Ranawng, *Haniff 376* (BM, K, SING); Kaw Tao, Surat, *Kerr Nos. 11169* (BK, BM, E, K, L, P); *12699* (BK, BM, K, P); *12786* (BM, E, K, L, P) and *16016* (BK, BM); Kaw Prap, Surat, *Franck 473* (C) and *Kerr 12524* (BK, BM); Kaw Pa-ngan, Surat, *Put Nos. 834* (BK, BM) and *1262* (BK, BM); Aow

Luk, Krabi, *Kerr 18556* (BK, BM); Kaw Pipi, Krabi, *Kerr 18906* (BK, BM); Chawng, Trang, *Din 316* (BKF); Tola, Satul, *Kerr 13852* (BK, BM); Pulau Adang, Satul, *Kerr 14080* (BK, BM); Nakawn Sritamarat, *Vanpruk 775* (K); Kiriwongse, N. Sritamarat, *Chit 831* (SING); Tepa, Songkla, *Kerr 14735* (BK, BM); Lem Son, Songkla, *Kerr 15127* (BK, BM).

Also see Gard. Bull. Sing. 16 (1958) 327 for list of further localities in Peninsular (Lower Siam).

MALAY PENINSULA: Perlis, Kedah, Kelantan, Penang, Trengganu, Pahang, Malacca, Johore, Singapore. For list see Gard. Bull. Sing. 16 (1958) 327.

SUMATRA ATJEH: Pulau Beras, *Koorders 10532* (BO, SING).

RIOUW ARCHIPELAGO: Pulau Karas, Gunong Karas, *Teijsmann s.n.* (BO).

DISTRIBUTION: China (Yunnan), Lower Burma, Indo-China, Siam, Malay Peninsula, Sumatra. This species has not been recorded previously from Sumatra.

TYPE MATERIAL: *Myristica globularia* Lamk, *Sonnerat s.n.* et *s.l.* (C, G, P holotype). *K. bicolor* Raf. based on *K. corticosa* Lour., according to Merrill in Trans. Amer. Phil. Soc. 24 (1935) 163 ("A Commentary on Loureiro's Flora Cochinchinensis") but no type is stated. *K. corticosa* Lour., *Loureiro s.n.* (BM holotype). *K. corticosa* var. *tonkinensis* Warb., *Balansa Nos. 1012* (BR, G and Boiss., K, P); *4196* (K, P) and *4198* (BR, G and Boiss., K, P). *K. petelotii* Merr., *Pételot 6608* (A holotype, TI). *K. wangii* H. H. Hu, *Wang 80634* (K, P). *Myristica chereevensis* Pierre, *Pierre 5431* (BR, E, G and Boiss., P). *M. glaucescens* Hk. f. et Th., *Cuming 2315* (A, BM, C, G and Boiss., K, L, LE, M, P, UPS) and *Griffith 4344* (A, BM, C, CAL, DD, FI, G and Boiss., K, LE, M, P, S). *M. lanceolata Wall. Cat. 6794* (A, BM, BR, CGE, G and Prodr., K, LE, M). *M. missionis* King, *Wall. Cat. 6788* (K, CAL). *M. sphaerula* Hk. f., *Cantley 31* (K holotype, SING).

VERNACULAR NAMES: *Kyweith wegyi* (Burma); *mau cho; huyêt muông* (N. Vietnam); *huyêt câu* (C. Vietnam); *sang mau* (S. Vietnam); *sma krebey* (Cambodia); *thom luat; luat ma* (Laos); *ham bai lek; ka ham; luat fai; luat khwai*, the most widely used name; *luat kwat; luat ma; luat raet; mui han* (Siam).

(12) **Knema glomerata** (Blanco) Merr. in J. Str. Br. Roy. As. Soc. 76 (1917) 81 excl. *Villamil 241;* Sp. Blancoanae (1918) 151 et Enum. Phil. Fl. Pl. 2 (1923) 183.

Basionym: Sterculia glomerata Blanco, Fl. Filip. (1837) 764, ed. 2 (1845) 525, ed. 3, 3 (1879) 164; F.-Vill. Novis. App. (1880) 27; Merr. in Govt. Lab. Publ. (Philip.) 27 (1905) 24, 73.

Synonyms: Sterculia decandra Blanco Fl. Filip. (1837) 766, ed. 2 (1845) 526, ed. 3, 3 (1879) 166. *Myristica heterophylla* F.-Vill. Novis. App. (1880) 178; Vidal, Rev. Pl. Vasc. Filip. (1886) 220. *M. corticosa* (Lour.) Hk. f. et Th. sensu F.-Vill. Novis. App. (1880) 178; A.D.C. Prodr. 14 (1856) 205 quoad Philip. Vidal, Phan. Cuming. Philip. (1885) 139 et Rev. Pl. Vasc. Filip. (1886) 220. *M. iners* Bl. sensu Vidal, Rev. Pl. Vasc. Filip. (1886) 221. *M. laurina* Bl. sensu Vidal, Rev. Pl. Vasc. Filip. (1886) 221. *M. glaucescens* (Jack) Hk. f. et Th. sensu Ceron, Cat. Pl. Herb. Manila (1892) 141 excl. *Vidal Nos. 3548 & 3568,* see note under type material. *M. stenocarpa* (Warb.) Boerl. Handl. Fl. Ned. Ind. 2, 1 (1900) 91 nom. alt. *Knema heterophylla* (F.-Vill.) Warb. Monog. Myrist. (1897) 573 t. 25 f. 1–2; Merr. in Philip. Journ. Sc. 1 bot. suppl. (1906) 55 et 3 bot. (1908) 407. *K. heterophylla* var. *pubescens* Warb. Monog. Myrist. (1897) 576 = [*M. laurina* Bl. sensu Vidal l.c. 221]. *K. stenocarpa* Warb. Monog. Myrist. (1897) 577; Elmer Leafl. Phil. Bot. 3 (1911) 1064; Merr. Enum. Phil. Fl. Pl. 2 (1823) 184–**syn. nov**. *K. vidalii* Warb. Monog. Myrist. (1897) 615; Merr. Enum. Phil. Fl. Pl. 2 (1923) 184—**syn. nov**. *K. gitingensis* Elm. Leafl. Phil. Bot. 3 (1911) 1065. *K. acuminata* Merr. in Philip. J. Sc. 17 (1920) 256—**syn. nov?**—**Fig. 11**.

Tree 5–12 m. high. *Bark* grey, smooth or flaking slightly in old trees; sap pink, copious. *Twigs* when young 2 mm. thick and rusty-furfuraceous at the apex, becoming smooth and dark reddish-brown, lower down grey, striate and stouter. *Leaves* chartaceous, elliptic, elliptic-lanceolate or lanceolate, usually widest at the middle, sometimes with one or two sinuations or small lobes (hence *heterophylla*), glabrous except the lower midrib which later sheds its rusty scurf, medium green and dull to shining above, glaucous beneath, apex acute, base rounded or acute: midrib raised on both surfaces; nerves 12–20, average 16 pairs, faint above, prominent beneath, curving and interarching at the margin; reticulations faint above, fine but visible beneath; length 12–23 cm., average 17 cm., breadth 3.5–9 cm., average 7 cm.; petiole 1 cm. long. *Male flowers* rusty-tomentose or occasionally tomentulose outside, pink or red inside, 3–4 mm. long, 5 mm. broad in bud and 7–8 mm. across when expanded; pedicels 4–7 mm. long with a median bracteole,

Fig. 11. *Knema glomerata* (Blanco) Merr.

A, twig with leaves. B, lobed leaf. C, male flowers. D, male flower enlarged. E–F, staminal column. G, female flowers. H, female flower enlarged. I, ovary and stigmas. J, fruit. A from *Sinclair & Edaño 9454* (SING). B from *Ramos 1482* (NY). C–F from *Williams 900* (NY). G–I from *Curran 10477* (NY). J from *McGregor 22974* (NY).

staminal disc white, convex with 8–13, average 11, sessile anthers. *Female flowers* 5 mm. long with a thicker, 5 mm. long pedicel; ovary rusty-tomentose; stigma sessile, green, bi-lobed, each lobe again divided into 3–4 lobes or serrations. *Fruit* oblong, sub-globose or obovoid, 2–2.5 cm. long and 1.8–2.3 cm. broad, covered with rusty scurf; stalk 5 mm. long.

PHILIPPINES MINDORO: Vicinity of Puerto Galera, *Bartlett 13476* (A); Mt Yagaw, *Conklin 17441* (PNH, US); *M. D. Sulit & Conklin 17628* (BM, K, PNH) and east of Mt Yagaw, *Conklin 37576* (L, SING); Mt Halcon, *Edaño 3241* (A, BR, L, PNH); Baco River, *McGregor 245* (K); Paluan, *Ramos 39614* (A, CAL, NSW, SING, TOFO); Pinamalayan, *Ramos Nos. 40865* (A, P); *40924* (BO, L); and *41105* (P, US).

BATANES ISLANDS: Batan Island, Batanes Prov., *Ramos 80445* (K, NY, SING).

BABUYAN ISLANDS: Calayan Island, *Velasco 26652* (K, US); Camiguin Island, Camiguin Volcano, *Edaño 79136* (NY, SING); Mt Mapolapolo, Camiguin Island, *Edaño 79374* (BO, NY, SING); Camiguin Island, *Fénix 4049* (CAL, US).

LUZON: **Prov. Ilocos Norte:**—s.l., Paraiso *26280* (NY); Bangui to Claveria, *Ramos Nos. 33094* (BM, BO, L) and *33095* (A, P).

Prov. Apayao:—*Fénix Nos. 28026* (BM, (BRI, NSW, UC, US) and *28277* (CAL, SING).

Prov. Cagayan:—s.l., *Bernardo 24271* (K, US); *Klemme Nos. 7058* = (2090) (BO, DD) and *13417* (BR, LE); Lagum, vicinity of Peñablanca, *Adduru 243* (A, K, P, US); Gonzaga, *Edaño 78242* (NY); Mt Bawa, *Edaño 78484* (NY).

Prov. Isabela:—Ilagan, *Vidal 3559* (K); Malunu, *Warburg Nos. 11589* (L, M, P, W) and *11590* (C, FI, G and Boiss., L, LE, M).

Prov. Nueva Vizcaya:—*Ramos 8266* (BO, CAL, L).

Prov. Benguet:—Sablan, *Elmer 6156* (G and Boiss., K, NSW, NY, P, TI, US); Baguio, *Elmer 8957* (A, BO, E, FI, G, K, L, LE, NSW, NY, US).

Prov. Nueva Ecija:—Mt Umingan, *Ramos & Edaño 26423* (A, K, US).

Prov. Zambales:—Olongapo, *Alambra 23451* (US); s.l., *Curran 5996* (CAL) and *Medina 23537* (BO, US).

Prov. Tarlac:—La Paz, *Vidal 509* (FI, K, L); Camiling, *Zschokke 15396* (BM, NSW).

Prov. Bataan:—s.l., *Curran 17317* (BM, NSW); *Elgincolin & Ranario 27765* (BM, BO); *Pascual 28794* (K, MEL); Lamao F.R., *Foxworthy 1590* (PNH); Lamao River, Mt Mariveles, the following:—*Barnes 500* (NY, US); *Borden Nos. 625* (BO, K, NSW, NY, SING, US); *1180* (BO, K, NSW, NY, SING, US); *1372* (K, NY, US); *1655* (K, NSW, NY, US); *1663* (K, NSW, NY, US); *2556* (BO, K, NY, SING, US); *2723* (K, NY, US); UC accession *Nos. 239236* (UC) and *239547* (UC); *Merrill 2533* (A, CAL, K, NY, SING, US); *Meyer 2815* (BO, K, NY, SING, US); *Warburg Nos. 13644* (C, L, LE, M, W) and *13644a* (C, G and Boiss., L, M); *Whitford 366* (K, NY, P, US) and *520* (K, NY, US); *Williams Nos. 900* (NY) and *901* (NY).

Prov. Rizal:—s.l., *Ahern's collector 3192* (BO, K, NY, SING, US); *Mariano 27159* (BM, US); *Ramos 1072* (A, BRSL, FI, G, M, U, UC, US); *Ramos 2638* (BM, NSW); Montalban, *Loher Nos. 6702* (M); *6711* (K, M); *6713* (M); *6714* (BO, K, M, US) and *6720* (K, M); Bosoboso, *Ramos 1482* (BO, CAL, NY, US); Mt. Susong, Dalaga, *Ramos & Edaño 29268* (A, US).

Prov. Cavite:—*Ramos & Deroy Nos. 22574* (A, BM, BO, CAL, K, L, NSW, P, SING, UC, US) and *22583* (A, BO, BRI, CAL, NSW, SING, UC, US).

Prov. Laguna:—s.l., *McGregor 22974* (A, BO, CAL, K, NY, P, SING, US); Los Baños, *Elmer 8228* (BO, K, NY); *Tamesis Nos. 11932* (L) and *11946* (BO, BR, CAL, LE); San Antonio, *Ramos Nos. 10957* (BO, E, CAL) and *21980* (K, US); Mt Makiling, *Baker 3309* (BRI, K, SING); *Ballesteros 9474* (PNH); *T.B. Bañaga 33399* (L, PNH, US); *Canicosa 9719* (PNH); *Elmer 17565* (A, BM, BO, C, CAL, G, K, L, P, NY, S, U, UC, US); *Esben 34287* (PNH); Forestry *Student 34126* (KEP, PNH); *Holman 81* (A); *Ilagan 35487* (PNH); *Lamanilao 34269* (PNH); *Peralta 35480* (PNH); *Quitoles 34366* (K, PNH); *Rosenbluth & Tamesis 12690* (BO); *Sinclair & Edaño 9454* (B, E, K, L, M, PNH, SING); *Sulit, Mendoza & Student 20* (NY); *M.D. Sulit Nos. 3224* (PNH); *7053* (A, BR, DD, PNH); *7054* (PNH) and

22880 (BM, BO, K, L, PNH, US); *Sumague 37301* (PNH); Mt Banajao, *Ocampo 27913* (A, BO, NY).

Prov. Batangas:—*Merrill 504* (A, BM, BO, CAL, K, L, NY, NSW, P, US).

Prov. Quezon:—Alabat Island, *Ramos & Edaño 48143* (NY, UC); Tayabas, *Bawan 24613* (A, K, US); *Manuel 21639* (US) and *Vidal Nos. 3549* (K); *3571* (K) and *3572* (K); Kinatakutan, Tayabas, *Oro 30833* (NY, SING); Mt Binuang, *Ramos & Edaño 28595* (A, BRI, US).

Prov. Camarines:—s.l., *Aguilar 24533* (BRI, US); *Alvarez 21444* (BRI, K, P, US).

Prov. Camarines Sur:—Mt Isarog, *Curran 10436* (BO, BR, CAL); s.l., *10477* (BO, NY, US); Alanao, Bicol National Park, *Sinclair & Edaño 9553* (B, E, K, L, M, P, PNH, SING).

Prov. Albay:—*Aguilar 14301* (BR); *Cuming Nos. 844* (BM, C, CGE, FI, G and Prodr. and Boiss., K, L, LE, M, MEL, P, UPS, W); *1309* (BM, CGE, FI, G and Boiss., K, L, LE M, MEL, NY, P, UPS, W) and *1042* (CGE, FI, G and Boiss., K, LE, P, W); Bulan, *Vidal 3551* (K).

Prov. Sorsogon:—Irosin (Mt Bulusan) *Elmer Nos. 16229* (A, BM, BO, C, CAL, G, K, L, NSW, NY, P, U, UC, US) and *16616* (A, BM, BO, C, CAL, FI, K, L, NSW, NY, P, PNH, S, U, UC, US, W).

POLILLO ISLAND: *McGregor 10344* (BO, BR, CAL, LE).

MARINDUQUE: *Vidal Nos. 1679* (FI, L) the K duplicate is *M. agusanensis* (in Warb. under *M. cumingii* p. 443) and *3564* (K).

CATANDUANES: *Ramos & Edaño Nos. 75339* (BO, CAL, NY, SING, UC) and *75534* (CAL, SING, UC).

SIBUYAN: Mt Giting-giting, *Elmer 12200* (A, BM, BO, BRSL, CAL, E, G, K, L, NSW, NY, US).

TICAO: *Clark 1086* (K, NY, US).

SAMAR: *Ramos 17590* (P, US); Mt Cansayao, Catarman, *M.D. Sulit 14417* (K, L, PNH).

LEYTE: *Rosenbluth 12744* (US); *Wenzel Nos. 743* (A, BM, G) and *1134* (A, BM, G); Dagami, *Ramos 15277* (K, US).

BILIRAN: *McGregor 18576* (A, P, US).

CEBU: *Espinosa 6418* (SING).

NEGROS: *Curran 17462* (BR, BRI, CAL, LE); Negros Occidental, Dumaguete, Cuernos Mts, *Elmer 10132* (A, E, G, LE) and Insular Lumber Co. track, Faraon, *Meyer & Foxworthy 13569* (BO, CAL, L, P).

PANAY: *Edaño 45971* (BM, BRI, DD, NY, S, SING, UC); Jamindan, *Ramos & Edaño 30948* (A, BM, P); Libacao, *Ramos & Edaño 31461* (A, K, UC); Migao, Prov. Ilo-ilo, *Vidal 3566* (K).

GUIMARAS ISLAND: *Vidal 507* (FI, K, L).

SULU ISLANDS: Tawitawi, *Alcasid & Celestino 7499* (A) and *Ramos & Edaño 44119* (BM, BRI, DD, G, L, MEL, NY, SING, UC); *Warburg 13304* (M).

BASILAN: *Hutchinson 6110* (NY, P, US); *Miranda 18942* (BM, US).

MINDANAO: s.l., *Warburg Nos. 13303* (B, C, FI, L, M, P, W) & *13303a* (C, L, M, P, W).

Prov. Surigao:—*Borja 28139* (A, K); *Hutchinson 7560* (NY); *Ramos & Pascasio 34569* (A, K, US); *Wenzel Nos. 2789* (A, BR, K, M, NY, UC); *2979* (A, B, BO, BR, G, K, M, NY, SING, UC); *3411* (A, BO, BR, DD, G, K, NY, UC).

Prov. Agusan:—Jabonga, *Ramos & Convocar 83606* (NY); sub. prov. Butuan, *Rafael & Ponce 20745* (K, P, US).

Prov. Davao:—Todaya (Mt Apo) *Elmer Nos. 10960* (A, BO, BRSL, CAL, E, FI, G, K, L, LE, NY); *10990* (A, BM, BO, BRSL, CAL, E, FI, G, K, L, LE, NSW, NY, US, W) and *11935* (A, BM, BO, BRSL, CAL, E, G, K, L, LE, NSW, NY, US, W); Mati, *Ramos & Edaño 49330* (BO, C, DD, LE, SING, UC); Santa Cruz, *Williams Nos. 2876* (K, NY, US); *2892* (A, NY) and *2911* (DD, NY).

Prov. Cotabato:—Carmen, *Añonuevo 13563* (L, PNH).

Prov. Lanao:—*Guerrero 30364* (BM, G, NY, UC); Camp Keithley, Lake Lanao, *Clemens Nos. 964* (BO, G, M) and *1111* (G, US); vicinity of Dansalan, Momungan Road, *Zwickey 228* (A, NY); vicinity of Abaga, *Zwickey 655* (A, NY).

Prov. Zamboanga del Norte:—*Frake Nos. 38112* (L) and *38259* (L).

Prov. Zamboanga del Sur:—Malangas, *Ramos & Edaño Nos. 36854* (A, BM, BO, BR, K, L, P, US); *36879* (BO, P, US); *37079* (A, BO, K, US); and *37444* (A, K, US); Banga, *Whitford & Hutchinson Nos. 6026* (BR); *9107* (K, US) and *9385* (NY, US); Sax River, *Williams 2340* (A, K, NY, US); Mt Tubuan, *Ramos & Edaño 36682* (A, K, P, US) not the Mt Tubuun in Prov. Cagayan.

DISTRIBUTION: Widely distributed throughout the Philippines.

TYPE MATERIAL: *Sterculia glomerata* Blanco, no type specimen; interpreted by Merr. from Blanco's description and vernacular names *tambalao* and *hindurugu*. *S. decandra* Blanco, no type specimen. *M. heterophylla* F.-Vill., *Vidal 507*. *M. corticosa* Hk. f. et Th. sensu F.-Vill. *Vidal 508* (not seen by me). *M. laurina* Bl. sensu Vidal = *K. heterophylla* var. *pubescens* Warb., *Vidal 509*. *M. glaucescens* Hk. f. et Th. sensu Ceron, *Vidal Nos.* [*3548* = korthalsii]; *3551; 3559;* [*3568* = kunstleri]; *3571* and *3572* = *glomerata*. *K. stenocarpa* Warb. *Warb. 13303*. *K. vidalii* Warb. = *M. iners* Bl. sensu *Vidal 1679*. *K. gitingensis* Elm., *Elmer 12200*. *K. acuminata* Merr., *Klemme 11266* Prov. Isabela, Luzon, not seen by me and presumed lost or destroyed.

VERNACULAR NAMES: *Alas* (Ig.); *alimpapañgan* (Neg.); *anoling* (P. Bis.); *dagdagan* (Ibn.); *dara-dara, dumadara & ubian* (Ilk.); *dogoan* (C., Bis., Mbo); *doguan* (Sbl., Tag., S., L., Bis.); *duguan* (Tag., Bik., P., Bis.); *dumadaga* (Ap.); *durugo & hindurugu* (Tag.); *kalahaglahag* (Sul.); *lago & libago* (Bag.); *lapak; margabulo; matumbaulalaki* (Tag.); *panigan* (Neg.); *parugan* (Tag.); *talihagan* (Neg.); *tambalau & tambalau-lalaki* (Tag.).

This is the commonest species of *Knema* in the Philippines and being widely distributed, is somewhat variable. It is close to *K. korthalsii* but the most reliable difference is the fewer nerves, 12–20, average 16 pairs as against 20–40 pairs in *korthalsii*. The flowers too, are slightly smaller than those of *korthalsii*, the male having 8–13, average 11 anthers as against 13–20, average 18 in *korthalsii*. For other differences see under *korthalsii*. I have seen no specimen of *K. acuminata* Merr., *Klemme 11266*, in any herbaria and I presume it is lost or destroyed. Merrill says that it is close to *K. vidalii* (a synonym of *K. glomerata*) but easily distinguished by its slenderly acuminate, few-nerved leaves. From the description I can only assume that it is a form of the common *glomerata* with

smaller leaves and fewer veins. As it was collected in Prov. Isabela in the north of Luzon, the habitat may not be so congenial as the warmer, less exposed south. Merrill in his Enumeration of the Phil. Fl. Plants 2 (1923) 183 lists *K. glauca* (Blume) Warb. as occurring in the Philippines, but the numbers quoted by him are only *korthalsii* and *glomerata.*

The specimens collected in Formosa at Kotosho Island, by *Kawakami* and *Nakahara, s.n., date 1905-06* (TI); *Kawakami* and *Sasaki s.n.* (TI) and *Sasaki s.n.* (TI) are not *K. glomerata.* They were first identified as *Myristica laurifolia* Hk. f., see Icones Plantarum Formosarum (Hayata) and later by Kudo and Masamune as *Myristica glomerata.* The last two authors made them the basis of a new combination:—*Myristica glomerata* (Blanco) Kudo and Masamune in Annual Rep. Taihoku Bot. Gard. 2 (1932) 89. I have examined the specimens and they are a coriaceous leaved variety of *Myristica cumingii* Warb. also known as *M. cagayanensis* Merr. It will be seen from the distribution list that *K. glomerata* has been found in the Batan Islands in the extreme north of the Philippines but so far not in Formosa. It should be looked for in the islands off the southern tip of Formosa, but perhaps most of the primary forests there have long since been cut down.

(13) **Knema hookeriana** (Hk. f. et Th.) Warb. Monog. Myrist. (1897) 551 t. 24 f. 1–4; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 237; Ridley, Fl. Mal. Pen. 3 (1924) 67; Corner, Wayside Trees of Malaya 1 (1940 & 1952 editions) 476 et Vol. 2 pl. 218; Sinclair in Gard. Bull. Sing. 16 (1958) 272 f. 1 pl. IA.

Basionym: Myristica hookeriana Hk. f. et Th. Fl. Ind. 1 (1855) 156; A.DC. Prodr. 14, 1 (1856) 204; Miq. Fl. Ind. Bat. 1, 2 (1858) 69 et Suppl. (1861) 384; Hk. f. Fl. Br. Ind. 5 (1886) 109; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 325 pl. 163.

SUMATRA EAST COAST: Huta Padang, near Continental Plantation Co. Concession, Asahan, Krukoff *4289* (BO) and *4445* (SING); Sibolangit, *Lörzing 5258* (BO, L, SING); Bandjalinggi, S. of Tebing-tinggi, *Lörzing 7512* (BO).

PALEMBANG: Lematang Ulu, *Lambach 1335* (BO, L, SING, U).

MALAY PENINSULA: All provinces except Perlis and Prov. Wellesley. For list see Gard. Bull. Sing. 16 (1958) 274.

New and first record for Kelantan:—Kuala Krai, *K.F.N. 68774* (KEP).

DISTRIBUTION: Sumatra and Malay Peninsula.

TYPE MATERIAL: *Myristica hookeriana Wall. Cat. 6802A* (A, BM, CAL, DD, E, G, K holotype, M).

The Labuan specimens of *Beccari* FI acc. Nos. *7787; 7787A; 7787B* and *7787C* (FI), collected by Low and quoted by Warburg, page 553, are not *K. hookeriana* but *K. furfuracea*. There are no records of *K. hookeriana* as yet from Borneo.

(14) **Knema intermedia** (Bl.) Warb. Monog. Myrist. (1897) 564 t. 25 f. 1–2; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 239; Koorders, Exkursionsflora v. Java 2 (1912) 258; Ridley, Fl. Mal. Pen. 3 (1924) 68; Corner, Wayside Trees of Malaya 1 (1940 & 1952 editions) 477; Sinclair in Gard. Bull. Sing. 16 (1958) 315 f. 15, pl. IIB.

Basionym: Myristica intermedia Bl. Rumph. 1 (1835) 187; Hk. f. et Th. Fl. Ind. 1 (1855) 158; A.DC. Prodr. 14, 1 (1856) 206; Miq. Fl. Ind. Bat. 1, 2 (1858) 70; Hk. f. et Th. Fl. Br. Ind. 5 (1886) 112; King in Ann. Roy Bot. Gard. Calc. 3 (1891) 317 pl. 154; Koorders en Valeton, Med. Lands Pl. Tuin 17 (1896) 192.

Synonyms: M. glauca Bl. sensu Zoll. Msc., Moritzi, System. Verzeichniss, Java (1845) 38. *M. glabra* de Vriese (non Bl.) Pl. Indiae Batavae Orientalis [Pl. Reinwardt.] (1857) 85. *M. iteophylla* Miq. Fl. Ind. Bat. 1, 2 (1858) 59. *M. corticosa* var. *decipiens* Miq. in Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 51.

SUMATRA WEST COAST: Sungei Bulu, Padang, *Beccari 901* (FI, K, L, MEL); Pajakumbu, *Teijsmann 478* (BO, U).

EAST COAST: Jungle near Aek Kanopan, Lundut Concession, Kuala, *Bartlett 7329* (K, L, NY, US); Si Mandi Angin, Sungei Kanan, Subdivision Labuhanbatu, District Kota Pinang, *Rahmat Si Boeea* (*R. Si Toroes*) *4008* (A, L, NY, UC, US); Huta Bagasan, Asahan, *Rahmat Si Boeea Nos. 6887* (A, S, SING, UC, US) and *7982* (A, S, SING, UC, US); vicinity of Lumban Ria, Asahan, *Rahmat Si Boeea 8054* (A, S, SING, UC, US); Bengkalis, *Bruinier 274* (BO); Selat Pandjang, P. Tebing-tinggi, *Bruinier 209* (BO); P. Mendol, *Bruinier 240* (BO).

PALEMBANG: Banjuasin & Kubestreken, *T1135* (BO); Gunong Meraksa, *Forbes 2573* (BM, CAL, L, LE); Lematang Ulu, *Lambach 1348* (BO, L); Ranau, G. Pakiwang, *de Voogd 463* (BO).

LAMPONG: S.l., *Teijsmann s.n.* (BO).

BANKA: Lobok Besar, *Kostermans & Anta 184* (BO, K,L); Djebus, *Teijsmann s.n.* (BO, SING); Sungei Liat, *Teijsmann s.n.* (BO, SING).

LINGGA ARCHIPELAGO: Pulau Singkep, *Teijsmann s.n.* (BO, SING).

RIOUW ARCHIPELAGO: Tanjong Pinang, *Teijsmann s.n.* (BO, SING).

MALAY PENINSULA: All provinces except Perlis, Kedah, Trengganu, Pahang and Negri Sembilan. For list see Gard. Bull. Sing. 16 (1958) 317.

JAVA S.L.: These are probably all in West Java:— *Blume s.n.* (BO, K, LE, U) must be Salak and Tjampea; *Jelinek s.n.* (LE, W); *Kuhl & Hasselt s.n.* (CAL, L); *Lobb 315* (A, BM, E, FI, G and Boiss., W) not Singapore; *Zollinger 1163* (BM, FI, G and Boiss., LE, MEL, P).

WEST JAVA: Batu Hidung, Tjimara, Udjong Kulon, *Koorders Nos. 5262* (BO, CAL, L, P); Bantam, *Forbes 542a* (BM, BO, CAL, FI, K, LE); *Bogor JA 6886* (L, PNH); Gunong Paniisan, Bogor, *Bakhuizen v.d. Brink 6141* (BO, L); Pasir Kiaradjingkang, west of Bogor, *Bakhuizen v.d. Brink 6381* (BO, BRI, L); Tjampea, *Koorders Nos. 15522* (BO) and *30470* (BO, L); G. Tjibodas, Tjampea, *Reinwardt s.n.* (L, MEL) and one sheet (L) is probably Blume; Tjampea, *Warburg 2500* (LE, W); Parungkuda, Tapos near Tjisalak, Preanger, *Bakhuizen v.d. Brink 5064* (BO, BRI, CAL, G and Boiss., K, L, P, SING, U, UC); Pelabuanratu, Preanger, *Koorders Nos. 5238* (BO, L); *5239* (BO, K, L); *5240* (BO, CAL, L, P); *5242* (BO, L); *5248* (BO, L); *5267* (BO); *11790* (BO, K, L); *11793* (BO, L); *12277* (BO); *12294* (BO, L); *33063* (BO) and *33122* (BO).

BORNEO SARAWAK: Near Kuching, *Haviland 1967* (CAL, K, SAR, SING); Matang (*Haviland*) *Garai 1440/1086* (SAR); Sungei Tissak, Triso, *Anderson Nos. SAR 3184* (KEP, SAR, SING) and *SAR 3185* (KEP, SAR, SING); Loba Kabang Protected Forest, Sibu, *Anderson SAR 412* (KEP, SAR, SING); Binatang, Pulau Bruit, *Anderson SAR 9039* (BO, K, L, SAR, SING) and *9055* (BO, K, L, SAR, SING); Sungei Kelepu, P. Bruit, *Anderson SAR 7931* (BO, K, L, SAR, SING).

SOUTH AND SOUTH-EAST BORNEO: S.l., *Korthals s.n.* (CAL, L, MEL); *Teijsmann s.n.* (BO, U); 10 km. west of Sampit, *Buwalda 7820* (A, BO, K, L).

NATUNA ISLANDS: G. Ranai, P. Bunguran, *v. Steenis 1335* (BO, L, SING).

CULTIVATED: Hort. Bog., *Beccari Nos. 7760* (FI); *7761* (FI); *7762* (FI) all origin Palembang; *Kurz 1522* (CAL); *Teijsmann, date 1867* (MEL); *Warburg 1743* (C, G and Boiss., L, M, P, W) origin Banka; *IVG 85* (NY, US).

DISTRIBUTION: Sumatra, including Banka, Riouw-Lingga Archipelago, Malay Peninsula, Borneo in part and West Java.

TYPE MATERIAL: *M. intermedia* Bl., Salak, Tjampea and mountains of West Java. No collector stated by Blume. He based the species on his own material. *M. glabra* de Vriese, *Reinwardt s.n.* (L, MEL). *M. glauca* Bl. sensu Zoll. *Zollinger 1163* (BM, FI, G and Boiss., LE, MEL, P). *M. iteophylla* Miq. *Teijsmann 478* (BO, U holotype). *M. corticosa* var. *decipiens* Miq., Borneo, *Korthals s.n.* (CAL, L, MEL).

VERNACULAR NAMES: *Ki-mokla* (W. Java); *kumpang* (Sarawak).

M. intermedia var. *minor* Miq. Japara, Java, *Teijsmann s.n.* (U holotype) is *K. cinerea* var. *sumatrana*. This species does not occur in Ambon or Batjan as stated by Warburg p. 566. The Moluccas specimens cited by him belong to *K. tomentella*. *Forbes 592* is *K. cinerea* var. *sumatrana*. *K. intermedia* var. *dubia* Warb. [Wall. Cat. *6810*] is *K. plumulosa*.

(15) **Knema kinabaluensis** J. Sinclair, **sp. nov.**—**Fig. 12.**

Species affinis *K. rigidifoliae* a qua foliis minus coriaceis et plerumque minoribus, antheris paucioribus, fructibus oblongis minoribus differt. Aspectu foliorum *K. cinereae* var. *sumatranae* ex montibus borneensibus interdum similis sed nervis et reticulationibus supra valde elevatis dissimilis.

Arbor 10–20 m. alta. *Cortex* griseo-brunneus laevis; latex roseus exilis. *Ramuli* apicibus nigro-brunnei, puberuli, infra griseo-brunnei, glabri, striati. *Folia* coriacea lanceolata utrinque acuta, supra atro-viridia, nitida, subtus glauca, 10–18 cm. longa, 3–5 cm. lata; costa utrinque elevata supra albo-viridis subtus flavo-viridis sed in sicco hic modice brunnea; nervi 16–20–jugati utrinque elevati subtus brunnei; reticulationes densae utrinque distinctae; petioli 1–2 cm. longi. *Flores masculi* 4–5 mm. longi extus ferrugineo-pubescentes, intus roseo-albi, lobis 3–5, antheris 7–10 distantibus flavidis breviter stipitatis, disco roseo, plano vel leviter convexo praediti; pedicelli 3–4 mm. longi medio bracteolati. *Flores feminei* longe urceolati 7–8 mm. longi; ovarium ferrugineo-pubescens 3 mm. longum in stylum bifidum terminatum. *Fructus* oblongus ferrugineo-tomentellus, secus suturam valde angulatus, 3.5–4 cm.

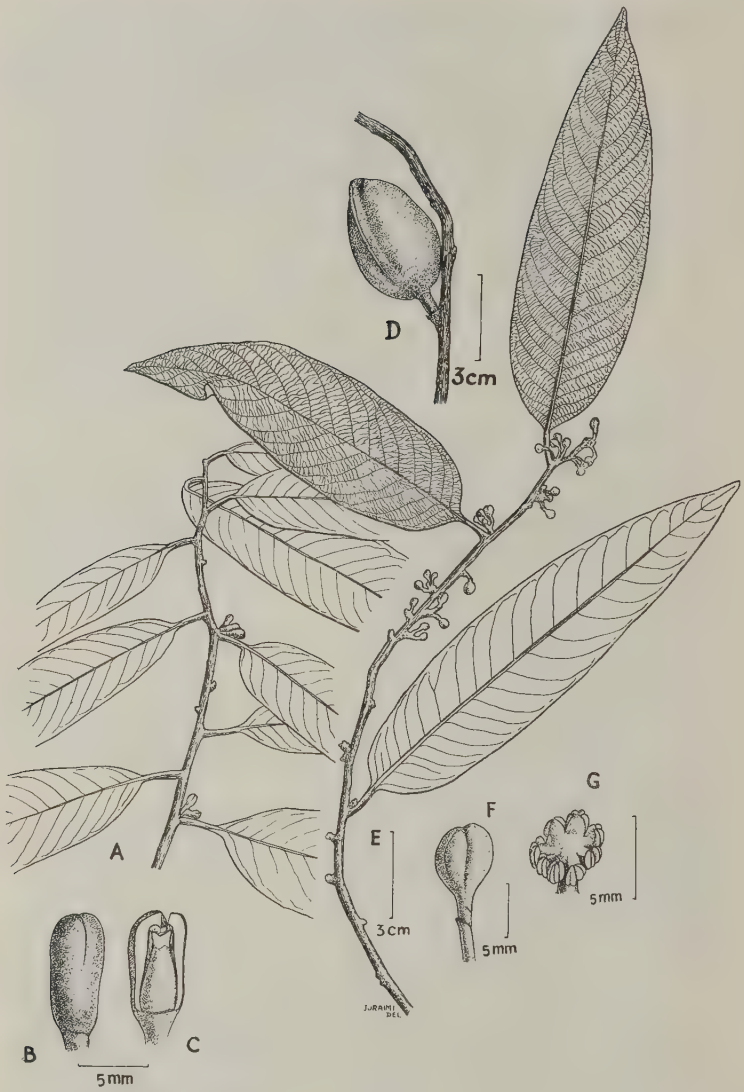


Fig. 12. *Knema kinabaluensis* J. Sinclair.
A, twig with leaves and female flowers. B–C, female flowers. D, fruit. E, twig with male flowers. F, male flower enlarged. G, staminal column. A–C from *Sinclair 9006* (SING). D from *Clemens 29515* (SING). E–G from *Sinclair 9224* (SING isotype).

longus, 2.5 cm. latus cum stipite 5–8 mm. longo. *Arillus* roseo-ruber. *Seminis* integumentum exteriore carneum griseo-album, interiore crassum, nigro-brunneum.

Tree 10–20 m. high. *Bark* greyish-brown, smooth; sap pink, not very copious. *Twigs* blackish-brown at the apices, minutely puberulous, greyish-brown lower down and soon glabrous, striate. *Leaves* coriaceous, lanceolate, base and apex acute, dark green and glossy above, glaucous beneath; midrib raised on both surfaces as are the nerves, whitish green above, yellowish green beneath, drying medium brown beneath; nerves 16–20 pairs, parallel and oblique, also drying a medium brown beneath; reticulations distinct, forming a close network above and below; length 10–18 cm., breadth 3–5 cm., petiole 1–2 cm. long, drying black. *Male flowers* 4–5 mm. long, rusty-pubescent outside, pale pinkish-white inside, 3–5 lobed; anthers 7–10, well-spaced, yellow, very shortly stalked; disc flat or slightly convex, pink; pedicels 3–4 mm. long with a minute, median bracteole. *Female flowers* elongate-urceolate, 7–8 mm. long; ovary rusty-pubescent, 3 mm. long ending in a bifid stigma. *Fruit* oblong, rusty-tomentulose, ridged longitudinally along the line of suture, 3.5–4 cm. long and 2.5 cm. broad; stalk 5–8 mm. long. *Aril* red with a pinkish tinge. *Seed*, outer coat greyish white and soft, inner blackish brown and hard.

BRITISH NORTH BORNEO: All from Mount Kinabalu.

Barnton 515 (BM); Tenompok, *Clemens Nos. 26697* (A, BO, G, K, L, NY, UC); *28354* (A, BO, G, K, L, NY, UC); *29358* (A, BO, G, K, M, NY, UC); *29358* bis (A, BO, K, L, M, NY, UC); *29515* (A, B, BO, G, K, L, M, NY, SING, UC); *30283* (A, BO, G, K, L, NY) and *30321* (A, BO, G, K, L, NY, UC); Gunong Lenau, Tenompok, *Sinclair 9006* (E, K, L, SING); Dallas, *Clemens 26697A* (A, BO, G, K, L, NY, UC); Lobang, *Clemens Nos. 10334* (A, BO, UC) and *10342* (A, PNH, UC); Penibukan, *Clemens Nos. 31406* (BO, NY) and *31608* (A, B, BO, G, K, L, M, NY, SING UC); Colombon River, *Clemens Nos. 32498* (A, BM, BO, G, K, L, M, NY, SING, UC) and *34094* (A, BO, G, L, NY, UC); Marai Parai, *Clemens Nos. 33032* (BO, K, L, NY) and *33038* (A, G, K, UC); Keebambang River, *Clemens 34292* (A, B, BO, G, K, L, M, NY, SING, UC); Upper Kinabalu, *Clemens Nos. 40545* (A, G, K, L, UC) and *50012* (A, G, K); Lumu Lumu, *Sinclair 9224* (B, E, K, L, M, SAN, SING); Lumu Lumu

near Bunda Tuhan, *Wood & Wyatt-Smith K.F.N. 80346* (K, KEP, SAN, SING); ¾ miles S. of Lumu Lumu on path to Tenompok, *Wood & Wyatt-Smith A4484* (KEP, L, SAN, SING); Kundasan, *Wood & Kapis b. Sisiron SAN 16449* (KEP, L, SAN, SING); Kota Belud, *Wood & Wyatt-Smith K.F.N. 80343* (K, KEP, SAN, SING).

DISTRIBUTION: Mount Kinabalu, British North Borneo.

TYPE MATERIAL: *Sinclair 9224* (B, E, K holotype, L, M, SAN, SING).

This species is common on Mount Kinabalu at 5,000 ft. (ca. 1,538 m.) but also occurs from 3,000–7,000 ft. It is readily known by its oblong fruit, ridged on the suture, the short male pedicels, and the coriaceous leaves with raised nerves on both sides. The nerves dry brown on the lower surface. It most closely resembles *K. rigidifolia*, a mountain species from Fraser's Hill and the Cameron Highlands in Malaya, which has larger and more coriaceous leaves and a larger and globose fruit. Some mountain forms of *K. cinerea* var. *sumatrana* from North Borneo also at times resemble *K. kinabaluensis*, but they have less distinct reticulations on the upper surface of the leaf and the nerves here, too, are not raised nor are so distinct.

(16) **Knema korthalsii** Warb. Monog. Myrist. (1897) 557.

Synonyms: Myristica cinerea Poiret sensu A. Gray, Bot. Wilkes U.S. Explor. Exped. (1854) 35. *M. corticosa* (Lour.) Hk. f. et Th. var *borneensis* Miq. *nom. nud.* in schedula. *M. korthalsii* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 90 *nom. alt. M. mindanaensis* Warb. sensu Merrill in Philip. Bureau For. Bull. 1 (1903) 21 et Phil. J. Sc. 3 bot. (1908) 76—**syn. nov.** *Knema mindanaensis* (Warb.) Merr. pro parte non typica Enum. Phil. Fl. Pl. 2 (1923) 184—**syn. nov.** *K. insularis* Merr. in Phil. J. Sc. 30 (1926) 394—**syn. nov.** *K. cenabre* Merr. and Quisumb. in Phil. J. Sc. 37 (1928) 144 pl. 3—**syn. nov.**—**Fig. 13.**

Tree 7–20 m. high. *Twigs* 3–4 mm. thick and covered with rusty-furfuraceous scurf at the apex, lower down stouter, glabrous and greyish or straw-coloured, terete but sometimes flattened at the apex, rarely angled. *Leaves* chartaceous or thinly coriaceous, oblong-lanceolate, oblong, or oblong-obovate, acute at the apex, narrowed slightly to the rounded base, glabrous above, rusty-furfuraceous on the lower midrib, but soon glabrous, drying olive green above and glaucous beneath; midrib raised above and below; nerves 20–40 pairs, parallel, fine and raised above, very prominent beneath, interarching at the margins, often in a double

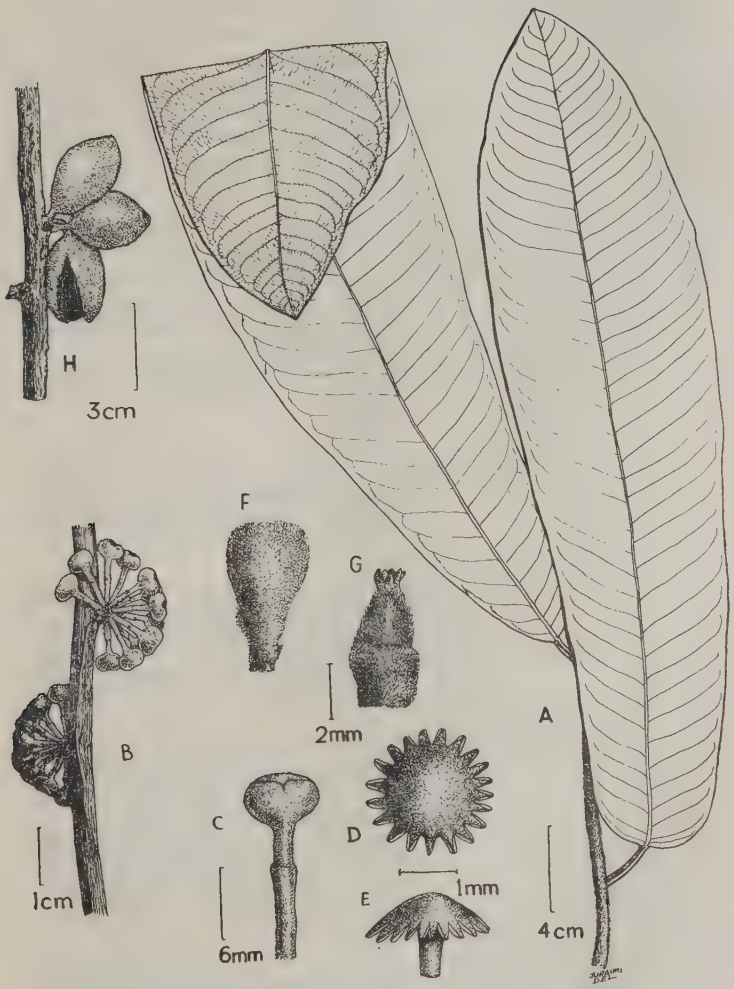


Fig. 13. *Knema korthalsii* Warb.

A, twig with leaves. B, male flowers. C, male flower enlarged. D–E, staminal column. F, female flower enlarged. G, ovary and stigmas. H, fruit. A from *Amdjah 440* (BO). B–E from *Puasa 1438* (L). F–G from *Buwalda 7937* (BO). H from *Amdjah 440* (BO).

loop; length 20–35 cm.; breadth 5–9–(12) cm.; petiole 1–2 cm. long. *Male flowers* numerous in umbels, medium brown and tomentose outside, red inside, trigonous and depressed in the centre in bud, 3–5 mm. long, 6–7 mm. broad in bud and 1 cm. broad when expanded; pedicels 8 mm.–1 cm. long with a minute bracteole at the middle or slightly above; staminal disc circular in outline, red, convex with 13–18–(20) nearly sessile anthers (18 average). *Female flowers* 8 mm.–1 cm. long, but on shorter, 4 mm. long pedicels; ovary rusty-tomentose, 3 mm. long with a sessile, bi-lobed stigma, the lobes again divided, each into 3–5 laciniations. *Fruit* oblong to obovoid, rusty-tomentulose, 2.5–3 cm. long and 1.8 cm. broad; pericarp 3 mm. thick; aril dark red; stalk 5 mm. long.

BORNEO SARAWAK: Sepudang, *Haviland 526/295* (SAR); Kapit, Upper Rejang River, *Native Collector 5280* (NY, UC).

WEST BORNEO: Lianggagang, *Hallier 2766* (BO, L, SING); Pontianak, *Teijsmann s.n.* (BO, L, SING).

SOUTH AND SOUTH-EAST BORNEO: S.l., *Korthals s.n.* (CAL, L, S, U); Sampit, *Buwalda 7937* (A, BO, K, L, SING); Banjermasin, *Motley 1146* (K); Hayup, *Winkler 2753* (BRSL, L).

EAST AND NORTH-EAST BORNEO: West Kutei, Sungei Gitan, *bb12744* (BO); East Kutei,Sungei Susuk Region, *Kostermans 5755* (BO, K, L); B. Ulu Sebaku, *Amdjah 440* (BO, L); Mt Medadem, N. of Sangkulirang, *Kostermans 13355* (BO, K, L, P).

BRITISH NORTH BORNEO: S.l., *F.D. 49116* (KEP); mile 26, Apas Road, Quon Hill, Tawau, *W. Meijer SAN 19436* (SAR, SING); Sapagaya F.R., *Kadir & Enggoh 10342* (K, L, PNH, SAN) and *Puasa 1438* (K, L); Cpt. 12, Sepilok F.R., *Patrick Ping Sam & Kapis SAN 19211* (SAR, SING); Kilugu & Bundu, *Apostal 2395* (UC); Tenom, *Gibbs 2803* (BM, K, US); near Batu Lima estate, Sandakan, *D. D. Wood 931* (PNH).

PHILIPPINES BALABAC ISLAND: *Ramos & Edaño Nos. 49729* (BR, NY, UC); *49747* (BR, K, NY, UC); *49811* (UC) and *49851* (NY, UC); Ligas, *Vidal* (Moseley) *3555* (K).

PALAWAN: *Agama 21605* (K, L, NY, P, US); *Cenabre 30099* (UC, US); *Merrill 9764* (A, K, US); Dumaran Island along Linuatan Creek, *Cenabre 29973* (K, NY, UC); Mt Balagbag, *Edaño Nos. 77780* (K, NY, SING)

and *77789* (NY, SING); Sagpañgan, Aborlan, *Celestino & J. Ramos 23002* (L, PNH); Puerto Princessa, *Cenabre 29232* (G, US).

SULU ISLANDS: Tawitawi, *Ramos & Edaño 44288* (A, B, BM, BO, K, NY, P, SING, UC); *Vidal Nos. 3547* (K) and *3548* (K).

BASILAN: *Hutchinson Nos. 108* (CAL); *3961* (K) and *3985* (K, US); *Miranda 18942* (BM, K, P, US); *Reillo Nos. 15421* (BM, DD, L, SING, US) and *15472* (L).

MINDANAO: **Prov. Surigao**:—*Wenzel 2513* (A, BO, BR, G, K, M, NY, UC); *2783* (A, B, BO, BR, G, K, M, NY, UC) and *3342* (A, BO, BR, G, K, L, M, NY, UC); Lake Manit, *Ramos & Convocar 83445* (NY).

Prov. Agusan:—Tungao, *Añonuevo 13735* (L, PNH); Cabadbaran (Mt Urdaneta) *Elmer 14040* (A, BM, BO, CAL, E, FI, G, K, L, LE, NSW, NY, P, U, UC, US, W).

Prov. Misamis:—*Miranda 11880* (P, US).

Prov. Davao:—Catalnan, *Kanehira 2511* (NY, TI).

Prov. Lanao:—*Acuña 23377* (A, US); *Jimenez 27048* (A, US); Camp Keithley, *Clemens 42885* (G, M) and s.n., *May 1906* (BO, CAL, G, M) and *Sept.-Oct. 1906* (BO); Vicinity of Olangu near Momungan, *Zwickey 784* (A, NY, UC).

Prov. Zamboanga:—s.l., *Ahern 393* (US) and *589* (BO, US); *Oliveros Belen 23328* (A, BM, CAL, K, L, NY, P, SING, US); *Quadras s.n.* (US); Port Batanga, *Whitford & Hutchinson 9310* (K, US); Malangas, *Ramos & Edaño Nos. 37027* (A, K, US); *37330* (A, NY); *37366* (BM, BO); *37443* BO, L) and s.l., *36828* (US); Caldera, *Cpt. Wilkes Exped. s.n.* (US); Malanipa Island, Challenger Exped., *Moseley, Jan.* and *Feb. 1875* (BK, K); Mt Tubuan, *Ramos & Edaño 36633* (A, BM, BRI, CAL); *Vidal 3554* (K).

DISTRIBUTION: Borneo, Southern parts of the Philippines (Mindanao, Basilan, Balabac, Sulu Islands and Palawan).

TYPE MATERIAL: *Knema korthalsii* Warb. (*M. corticosa* Hk. f. et Th. var. *borneensis* Miq.) *Korthals s.n.* S. and S.E. Borneo (CAL, L, S, U holotype). *K. cenabre* Merr. & Quisumbing, *Cenabre 29973* (K, NY). *K. insularis* Merr. *Ramos & Edaño 44288* (A, B, BM, BO, K, NY, P, SING, UC). *M. cinerea* Poir. sensu A. Gray, leaf specimens only, from Caldera, Mindanao, *Wilkes Exped.* (US).

VERNACULAR NAMES: Philippines:—*Biuku; duhao* (Sul.); *bunud; dugan; duguan; tambalau* (C. Bis.); salindupong (Lan.); *dago manok* (Cuy.)

This species is close to *Knema glomerata,* but differs from it in having more veins, 20–40 pairs, while *glomerata* has 12–20. The leaves usually have parallel sides and do not tend to be elliptic. They are generally more coriaceous while the twigs are thicker and stouter at the apex. The flowers are slightly larger with more numerous anthers, 13–20, average 18 as against 8–13, average 11 in *glomerata. Myristica mindanaensis* Warb. type *Warburg 13300,* a true *Myristica,* is a synonym of *M. fatua* but Merrill probably did not see the type when he made the combination *Knema mindanaensis* (Warb.) Merr. in Enum. Phil. Fl. Plants 2 (1923) 184. There he quotes several collectors' numbers all of which are *Knema korthalsii* but he does not mention *Warburg 13300.*

(17) **Knema kunstleri** (King) Warb. Monog. Myrist. (1897) 568 t. 25; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 241; Ridley, Fl. Mal. Pen. 3 (1924) 69, Sinclair in Gard. Bull. Sing. 16 (1958) 291 f. 8.

Basionym: Myristica kunstleri King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 314 pl. 149.

Synonyms: K. coriacea Warb. Monog. Myrist. (1897) 614. *K. parvifolia* Merr. in Philip. Journ. Sc. 13 (1918) 287 et Enum. Philip. Fl. Pl. 2 (1923) 184. *M. coriacea* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt. Gymnacranthera cryptocaryoides* Elmer, Leafl. Pilip. Bot. 3 (1911) 1060; Sinclair in Gard. Bull. Sing. 17 (1958) 115.

var. **kunstleri**

MALAY PENINSULA: Kelantan, Perak, Pahang, Selangor, Malacca. For list see Gard. Bull. Sing. 16 (1958) 293. There are now first and new records for Trengganu and Negri Sembilan. Trengganu, Bukit Bauk F.R., Dungun, *K.F.N. 80695* (KEP). Negri Sembilan, Sungei Menyala F.R., Port Dickson, *G. H. S. Wood K.F.N. 71868* (KEP); Negri Sembilan, Nilai, Jindaram Estate, *Md. Shah 62* (A, BKF, K, L, LAE, PNH, SING).

BORNEO SARAWAK: Kuching, *Beccari 670* (FI, G, K, P); near Kuching, *Haviland 2254/1761* (K, SAR); *Native Collector 164* (A, K, PNH, US); Setapok F.R., Kuching, *Boejeng b. Sitam, SAR 9302* (L, SAR, SING); Saratok Mangrove Reserve, Kuching, *Su'ut Ali SAR 7746* (K, L, SAR, SING); Telok

Waiding, Bako National Park, *Purseglove 5009* (K, L, SAR, SING); Lawas, *Senada SAR 2027* (SAR); Triso Peninsula, *Anderson SAR Nos. 2135* (SAR, SING) and *3178* (KEP, SING); Pulau Bruit, *Anderson SAR 2638* (KEP, SAR, SING); Sg. Kelepu, Pulau Bruit, *Ellias SAR 8030* (BO, KEP, L, SAR, SING); Binatang, Pulau Bruit, *Anderson SAR 9019* (BO, K, L, SAR, SING) and *Sanusi bin Tahir SAR 9249* (BO, K, KEP, L, SAR, SING); Saribas F.R., Betong, *Anderson SAR 8518* (BO, K, L, SAR, SING); Sungei Sabal Tapang, *Sinclair 10238* (A, E, SING).

BRUNEI: Badas Swamps, *Anderson SAR 2853* (SAR); Badas Saw-mill, *Ashton & Whitmore BRUN 686* (BO, K, L, SAR, SING); *Sinclair 10465* (A, B, BM, E, K, L, SING); Labu Forest Reserve, Temburong, *Ashton, Smythies & Wood SAN 17428* (K, L, SAN, SING); Seria, *Ashton, Smythies & Wood* SAR *5847* (BO, K, L, SAN, SAR, SING); Anduki F.R., *Anderson SAR 5551* (SAR).

PHILIPPINES LUZON: **Prov. Cagayan**:—Summit of West Mountain, Claveria. *McLean, Catalan & Peralta 129* (UC); Malaney, *Vidal 3568* (K).

Prov. Quezon:—Tagcauayan, Tayabas, *Ramos 13358* (BM, K).

Prov. Camarines Norte:—Paracale, *Ramos & Edaño Nos. 33456* (A, BRI, NSW, UC, US) and *33631* (BM, BO, CAL, L, SING); Atuñgon, Daet, *Arizabal 30500* (UC) and *Alvarez 22641* (K).

Prov. Albay:—Manito, *Curran 10573* (K, NY, US).

SIBUYAN: Magallanes, Mt Giting-giting, *Elmer 12262* (A, BM, BO, BRI, CAL, E, G, K, L, LE, NSW, NY, US).

SAMAR: Loquilon, Wright, *M. D. Sulit 6092* (A, L, PNH, SING); Mt Cansayao, Catarman, *M. D. Sulit 14324* (L, PNH).

DISTRIBUTION: Malay Peninsula, Sarawak, Philippines in peat swamp forest mostly but also in "kerangas".

TYPE MATERIAL: *Myristica kunstleri* King, all numbers of King, Scortechini and Wray from Perak. *M. coriacea* Warb., *Beccari 670* (FI holotype, G, K, P). *Knema parvifolia* Merr., *Curran 10573* (K, NY, US). *Gymnacranthera cryptocaryoides* Elmer, *Elmer 12262* (A, BM, BO, BRI, CAL, E, G, K, L, LE, NSW, NY US).

VERNACULAR NAME: *Duguan* (Samar).

var. **surigaoensis** J. Sinclair, **var. nov.—Fig. 14.**

A typo foliis chartaceis vel minus coriaceis, plerumque oblongo-lanceolatis angustioribus, magis acuminatis, nervis pluribus, reticulationibus minus prominentibus differt.

Leaves chartaceous or thinly coriaceous, oblong-lanceolate, the sides nearly parallel, drying greenish above, glaucous beneath except the brown midrib and nerves, apex acute or mostly acuminate, base rounded or acute; nerves 12–20 pairs (average 18), raised above but lying in depressions of the uneven leaf surface; reticulations forming a close, dense network, but not so prominent as in var. *kunstleri;* length 6–15 cm., breadth 2.5–4.5 cm., petiole 1 cm. long. *Flowers* and *fruit* as in the typical form.

PHILIPPINES MINDANAO: Tuiago, Tuhid, Placer, Prov. Surigao, *Wenzel Nos. 2680* (UC); *3048* (UC); *3474* (UC) and *3485* (UC); Prov. Surigao, s.l. *Ponce 25076* (A, BM, K, NY, P, US).

DISTRIBUTION: As above.

TYPE MATERIAL: *Wenzel 2680* (UC holotype).

Knema kunstleri has a wide distribution and hence is somewhat polymorphic, especially as regards the size and shape of the leaves. The leaves of var. *kunstleri* are generally elliptic or broadly elliptic with prominent reticulations, but they vary in size and shape, sometimes having narrow-elliptic or lanceolate leaves and sometimes a single specimen may have large and small leaves. *K. parvifolia* seems to be only a depauperate form from exposed ridges. The Surigao plants can be distinguished from typical var. *kunstleri* so it seems best to give them a varietal name, var. *surigaoensis*. The chief differences are the thinner, less broadly elliptic leaves, more veins and the less distinct reticulations in var. *surigaoensis*.

(18) **Knema latericia** Elmer, Leafl. Philip. Bot. 5 (1913) 1815; Sinclair in Gard. Bull. Sing. 16 (1958) 278 f. 3 and pl. IIA.

Synonyms: K. conferta (King) Warb. var. *borneensis* Warb. Monog. Myrist. (1897) 580 pro parte excl. *Beccari Nos. 1609, 1960 et 2482. K. elongata* Warb. nom. nud. in sched. *K. badia* Merr. nom. nud. in sched. *K. meridionalis* J. Sinclair in Gard. Bull. Sing. 13, 2 (1951) 297 f. 1. *M. conferta* King var. *borneensis* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 91 *nom. alt. Myristica ridleyi* Gandoger in Bull. Soc. Bot. France 66 (1919) 226 in clavi.

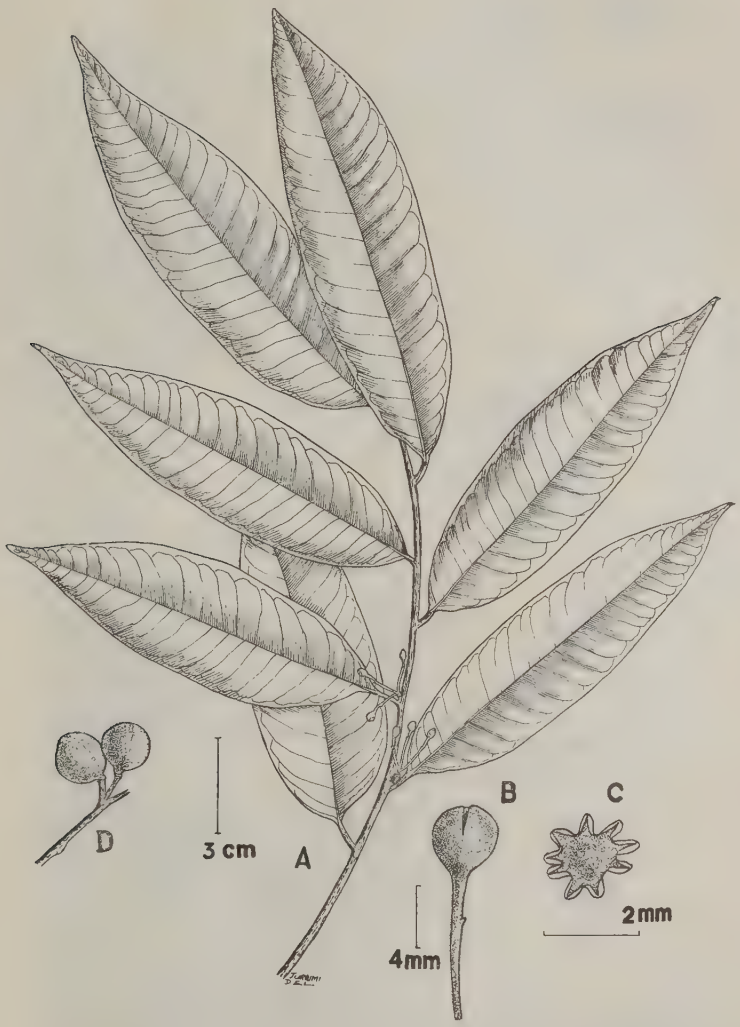


Fig. 14. *Knema kunstleri* (King) Warb. var. *surigaoensis* J. Sinclair.
A, twig with male flowers. B, male flower enlarged. C, staminal column. D, fruit. A–C from *Wenzel 2680* (UC holotype). D from *Ponce 25076* (A).

var. **latericia—Fig. 15B, F & G.**

INDO-CHINA CENTRAL VIETNAM (ANNAM): Mt Bana, Tourane, *Clemens 17th Aug., 1927* (UC).

SUMATRA BANKA: Djebus, *H.B. 3484* (BO); G. Mangkol, *Kostermans & Anta 691* (BO).

MALAY PENINSULA: Kedah, Perak, Johore, Singapore. For list see Gard. Bull. Sing. 16 (1958) 280.

BORNEO SARAWAK: Mt Matang, *Beccari Nos. 2003* (FI, K, P) and *2523* (FI); Mt Poi (Gunong Pueh) *Clemens Nos. 20086* (K, NY) and *20346* (NY, SAR); *Purseglove 4680* (A, K, L, LAE, SAR, SING); Baram, *Haviland 3307* (K, SAR); s.l., *Native Collector 2483* (A, K, PNH); R. Jalan, Usun Apau, *Pickles SAR 3850* (SAR, SING).

BRUNEI: Andulau F.R., *Anderson SAR 4946* (BRUN, SAR).

SOUTH AND SOUTH-EAST BORNEO: Sampit Region near Kuala Kuajan, *Kostermans 7964* (K, L).

EAST AND NORTH-EAST BORNEO: S.l., *Korthals s.n.* (CAL, L) two sheets in L and one has *K. korthalsii* also mounted on it; Bukit Kasian, *Amdjah 191* (BO); West Kutei, No. 36 near L. Petah, *Endert 3178* (A, BO, K, L) and *3342* (BO, K, L); Sg. Menubar region, E. Kutei, *Kostermans 5233* (BO, K, L, PNH); Sg. Susuk region, *Kostermans 5449* (BO, L); Teputsey, *Jaheri 914* (BO); Peak of Balikpapan, *Kostermans 7396* (BO, L); foot of Mt Ilas Bungaan, Berouw, *Kostermans 13721* (BO, K, L).

BRITISH NORTH BORNEO: S.l., *Agama Nos. 411* (K, US); *542* (A, K, PNH) and *556* (P); *Villamil 241* (A, BM, BO, K, L, P, PNH, SING, US); Tawau, *Elmer 20809* (A, BM, BO, BR, C, G, K, L, M, NY, P, S, SING, U, UC); Marutai, Tawau, *Tandom 1796* (K, L); Sub-Cpt. 13, Cpt. 2, Bombay-Burmah Trading Corp. Concession, Kalabakan, 30 mls. W.N.W. of Tawau, *Wood A3957* (KEP, L, SAN, SING); Masali, Lahad Datu, *Fabia A4003* (K, KEP, L, PNH, SAN, SING); Kinabatangan, *Evangilista 878* (A, NY); Batu Puteh, Kinabatangan, *Md. Maidin 1737* (K, L); Kabili-Sepilok F.R., *Castro 4503* (BO, CANB, K, L, PNH, SING, US); *Enchai* and *Enggoh Nos. 9394* (K, L) and *44569* (KEP); *Enggoh 7250* (K, L, PNH, SING); *Onggib Nos. 9395* (K, L,) and *44570* (KEP); *Otik 4913* (K, L, SING); Cpt.

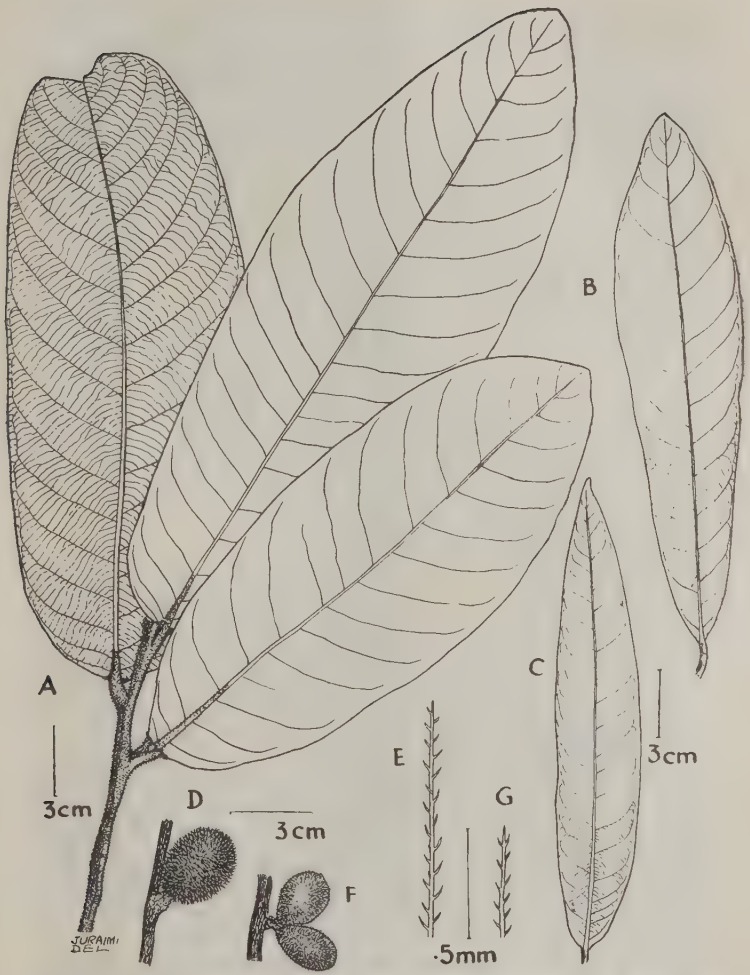


Fig. 15. *Knema latericia* Elmer vars. *latericia, albifolia* J. Sinclair and *lunduensis* J. Sinclair.

A, twig of var. *lunduensis*. B, leaf of var. *latericia* for comparison. C, leaf of var. albifolia. D, fruit of var. *lunduensis*. F, fruit of var. *latericia* for comparison. E, hair from fruit of var. *lunduensis*. G, hair from fruit of var. *latericia*, same scale. A from *Sinclair 10375* (SING). B, F and G from *Enggoh 7250* (SING). C from *Elmer 20895* (SING). D and E from *Sinclair 10360* (SING).

14 Sepilok F.R., *Wood Nos. A1996* (K, KEP, L, SAN, SING) and *SAN 15382* (BO, L, SAN, SING); Cpt. 10, *Wood & Charrington SAN 16515* (K, KEP, L, SAN, SING); Sapagaya F.R., *Sator 815* (A, NY); mile 7½, Block 1, B.N.B. Timber Co. Concession, Lungmanis, 25 mls. S.W. of Sandakan, *Wood A2917* (KEP, L, SAN, SING); Batu Lapan, Sandakan, *Puasa 2256* (*D. D. Wood*) (BO, UC); Kundasan, 10 mls. W. of Ranau, *Wood & Kapis b. Sisiron SAN 15293* (KEP, L, SAN, SING); Tenompok, *Clemens 28325* (A, BO, G, K, L, NY, UC); Gurulau, Upper Kinabalu, *Clemens 50433* (A, G, K, UC); Mt Sidungol, *Keith Nos. 9284* (K, SING) and *44481* (KEP); Payo River, *Allen 625* (A, SING) on the A sheet also mounted *K. cinerea* var. *sumatrana;* Semawang River, *Pascual 1081* (A, NY); Ulu Sipitang, 5 mls. E. of Sipitang, *Wood SAN 16918* (BO, K, KEP, L, SAN, SING); and west ridge of G. Lumaku, 10 mls. S.S.E. of Malaman, *Wood SAN 16709* (KEP, L, SAN, SING); Subak, *Arsat 1065* (NY, US).

LABUAN: *Motley 113* (K).

P. LAUT: Sungei Paring, *Verhoef 78* (BO, L, NY).

PHILIPPINES PALAWAN: S.l., *Agama 21612* (K, P, US); Sagpañgan, Aborlan, *Celestino & Ramos 23062* (K, L, PNH); Victoria Mts, *Edaño 14233* (L, PNH); Panacan, Aborlan, Victoria Mts, *M.D. Sulit 12456* (L, PNH); banks of the Iwahig River, Mt Pulgar, *Elmer 12757* (A, BM, BO, BRSL, CAL, E, G, K, L, LE, NSW, NY, P, U, US).

DISTRIBUTION: Central Vietnam, Banka, Malay Peninsula, Borneo, Philippines (Palawan).

TYPE MATERIAL: *Knema latericia* Elmer, *Elmer 12757* (A, BM, BO, BRSL, CAL, E, G, K, L, LE, NSW, NY, P, U, US). *K. badia* Merr., *Agama 21612* (K, P, US). *K. elongata* Warb., *Korthals (10)* (L). *K. meridionalis* Sinclair, *Sinclair S.F.N. 38561* (K, SING holotype). *M. ridleyi* Gandoger, *Ridley s.l., date 1898* (LY).

VERNACULAR NAMES: *Tambalau* (Tagb.) Philippines.

Not one of the numbers quoted by Warburg under the description of *K. conferta* var. *borneensis* Warb. can be identified with *conferta*. Four of the numbers are *K. latericia, Beccari 2003* and *2523* being var. *latericia,* while *Beccari 1594* and *1618* are var. *albifolia. Beccari 1609* and *2482* are *cinerea* var. *rubens* while *Beccari 1815* and *1960* are *K. communis. Elmer 21040* and *21409* were wrongly identified by Merrill [see Pl. Elm. Borneensis (1920) 74 as *K. conferta* var. *borneensis*]. They are *latericia* var. *albifolia.*

var. **albifolia** J. Sinclair, **var. nov.—Fig. 15C.**

A typo foliis angustioribus, supra pallidioribus, subtus albidis, nervis costaque utrinque pallidioribus differt.

Leaves 11–22 cm. long, average 17 cm., 2–5 cm. broad, average 3 cm., often slightly falcate, acute at the apex and base, drying pale yellowish-green above and white beneath with the nerves and midrib pale or whitish on both surfaces, less often pale brown. *Flowers* and *fruit* usually with paler tomentum.

BORNEO SARAWAK:	Mt Matang, *Beccari Nos. 1594* (FI) and *1618* (FI, K); left bank of Rejang River, 10 km. below Belaga, near airfield, Segaham Range, *M. Jacobs Nos. 5355* (CANB, L, SAR, SING); *5356* (CANB, L, SAR, SING) and *5393* (CANB, L, SAR).
EAST AND NORTH-EAST BORNEO:	West Kutei, *Endert 2434* (A, BO, K, L, SING); No. 43, Kombeng, W. Kutei, *Endert 5113* (BO, L); Sg. Bai, East Kutei, *bb Nos. 14871* (BO) and *14872* (BO); Sungei Susuk, Region, E. Kutei *Kostermans 5690* (BO, K, L); Mentawir River basin, Balikpapan, *Sauveur Nos. 111* (L) and *112* (K, L); Lelebulan Teputsey, *Jaheri 927* (BO).
BRITISH NORTH BORNEO:	Tawau, *Elmer Nos. 20895* (A, BM, BO, BR, C, G, K, L, M, NY, P, PNH, S, SING, U, UC); *21040* (A, BM, BO, BR, C, G, K, L, M, NY, P, S, SING, U, UC); *21409* (A, BM, BO, BR, C, G, K, L, M, NY, P, S, SING, U, UC) and *21410* (BO); 5 mls. north of Kinabatangan River at Bukit Garam (1 ml. east of Lamag, B. B. T. Co. Concession) *Wood A4665* (KEP, L, SAN, SING); Lagsikan F.R., Sandakan, *Bukah A3433* (K. KEP. L, SAN, SING); Kretam, Elopura, Sandakan, *Patrick Ping Sam A1883* (K, KEP, L, SAN, SING); Cpt. 16 Sepilok F.R., *Sinclair 9296* (A, B, E, K, L, M, P, PNH, SAN, SING); Cpt. 14, *Wood SAN 15394* (K, L, SAN, SING).
PULAU NUNUKAN:	*Paymans 83* (BO, K, L).
DISTRIBUTION:	Borneo.
TYPE MATERIAL:	*Sinclair 9296* (A, B, E, K holotype, L, M, P, PNH, SAN, SING).

Distinguished from the typical form by the narrower leaves, average breadth 3 cm. and by their paler colour. The midrib and nerves and the flowers and fruits too, are paler, not the dark reddish-brown of the type.

var. **lunduensis** J. Sinclair, **var. nov.—Fig. 15 A, D & E.**

A *K. latericia* var. *latericia* ramis, ramulis (his apice crassioribus) et foliis paucioribus, foliis majoribus, basi plerumque rotundatis raro sub-cordatis, fructibus majoribus cum pilis longioribus differt.

Arbor 3–6 m. alta. *Ramuli* apice 4–5 mm. crassi, ferrugineo-tomentosi. *Folia* supra atro-viridia nitida, subtus glauca; 17–50 cm. longa (vulgo 25 cm.), 5–20 cm. lata (vulgo 10 cm.); costa supra albido-viridis, subtus flavido-viridis. *Fructus* 3–3.5 cm. longus, 2.5 cm. latus, cum pilis dendroideis 1.5–2 mm. longis.

Tree smaller in stature than typical *latericia* with fewer branches. *Twigs* thicker at the apex. *Leaves* larger and fewer, not unlike those of *K. furfuracea* but not cordate at the base (occasionally subcordate in the larger ones). *Fruit* larger than that of var. *latericia* with longer hairs.

BORNEO SARAWAK:	Gunong Gading, Lundu, 1st Division, *Purseglove 4549* (A, E, K, L, SING); *Sinclair Nos. 10360* (E, K, SAR, SING); *10375* (A, B, E, K, L, SAR, SING) and *10381* (A, E, K holotype, L, SAR, SING); Gunong Pueh (Poi), *Purseglove 4674* (A, K, L, SAR, SING); Bukit Mayeng, Tau Range, *Purseglove 5367* (SING).
DISTRIBUTION:	Borneo (Sarawak) endemic.
TYPE MATERIAL:	*Sinclair 10381* (A, E, K holotype, L, SAR, SING).

This tree is fairly common in deep shade on Gunong Gading. I did not first recognize it as a distinct variety until I saw it in the field. One may mistake it for *K. furfuracea* on account of its larger leaves, but these are not deeply cordate at the base as in that species. They are mostly rounded or occasionally subcordate. Further the fruit has much longer tomentum. It is interesting to note that Gunong Gading, G. Pueh and the Tau Range are composed of Tertiary granitic rocks and have probably not been inundated since that period. Other areas in Sarawak, composed of older, sandstone rocks, have been covered with water.

(19) **Knema latifolia** Warb. Monog. Myrist. (1897) 610 t. 25 f. 1–2.

Synonyms: K. umbellata Warb. Monog. Myrist. (1897) 609 —**syn. nov.** *K. nitida* Merr. in J. As. Soc. Str. Br. 85 (1922) 190—**syn. nov.** *K. winkleri* Merr. in J. As. Soc. Str. Br. 85 (1922) 189—**syn. nov.** *Myristica umbellata* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt.*—**Fig. 16.**

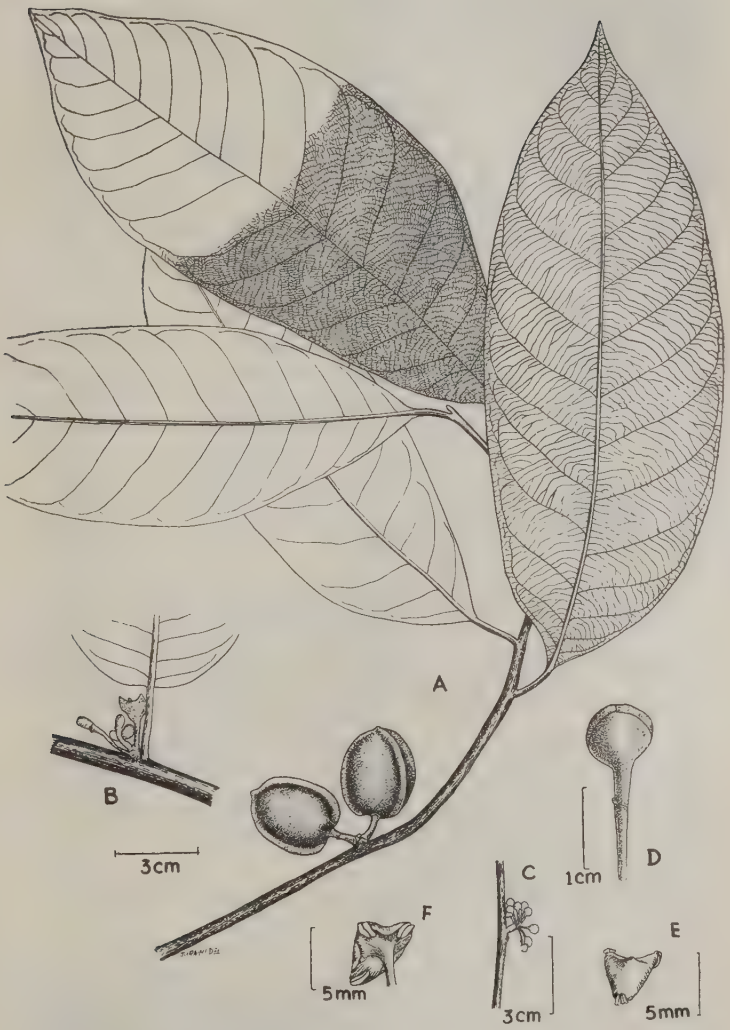


Fig. 16. *Knema latifolia* Warb.

A, twig with leaves and fruit. B, female flowers. C, male flowers. D, male flower enlarged. E–F, staminal column. A from *Main 2967* (A). B from *Ramos 1278* (SING). C–F from *Valera 1858* (PNH).

Tree 6–10 m. high with a cylindrical or pyramidal crown. *Bark* grey, brittle, nearly smooth, peeling in thin narrow strips but not furrowed or striate; sap red, copious. *Twigs* brown, glabrous, nearly smooth with some lenticels at the apex, rough and striate lower down. *Leaves* coriaceous, glabrous, very glossy above, even when dry, dark brown or with a blackish, metallic lustre, paler brown beneath (glaucous when fresh with a yellowish green lower midrib), oblong or elliptic-oblong, apex acute, slightly acuminate or rounded and obtuse, base acute or rounded; nerves 12–20 pairs, distinct and raised on both surfaces as is the midrib; reticulations distinct above, less so beneath; length 10–28 cm.; breadth 4–12 cm.; petiole 1.5–2 cm. long. *Male flowers* in umbels, rusty-tomentulose, 5–8 mm. in diam.; pedicels 5 mm. long with a minute bracteole above the middle (less often at the base of the perianth in immature flowers); staminal disc triangular with 3 sessile anthers, one at each angle of the disc. *Female flowers* 7–8 mm. long, more elongate than the male and on a 1 cm. long pedicel; ovary rusty-tomentose with a bifid stigma. *Fruit* oblong, rusty-tomentulose, becoming nearly glabrous, strongly ridged or almost winged along the suture, 3 cm. long and 2.5 cm. broad, the base broad and the apex obtuse; stalk 1–2 cm. long and 2–3 mm. thick.

SUMATRA PALEMBANG: S. Rupit, *Forbes 2997* (A, BM, CAL, FI, K, L, LE, UC); S. Rawas, *Forbes 3188* (BM, CAL, DD, K, L, LE).

BORNEO SARAWAK: Matang, *Beccari 1824* (FI, K) and *1991bis* (FI, K); Semengoh F.R., *Sinclair 10297* (A, B, E, K, L, NY, SAR, SING); and *Asah* Tree *No. 883* (SAR).

BRUNEI: R. Ingei-Ulu R. Belait Watershed, *Ashton BRUN 157* (BO, BRUN, K, L, SAR, SING).

WEST BORNEO: Pulau Bukit Tekemeng, *Main 2067* (A, BO, K, L, PNH, SING).

SOUTH AND NORTH-EAST BORNEO: Hayup, *Hubert Winkler 2390* (BO, G, K, L, P, PNH, SING).

EAST AND NORTH-EAST BORNEO: Loa Djanan, west of Samarinda, *Kostermans 6713* (SING); the following five West Kutei:—No. 24 L. Iboet, *Endert 2713* (A, BO, K, L); No. 36 near L. Iboet, *Endert 3158* (A, BO, K, L, SING); No. 19 L. Puhus, *Endert Nos. 4846* (BO, K, L) and *4889* (A, BO, K, L); Mt Palimasan near Tabang, Belajan River, *Kostermans 12816* (K, L); E. Kutei, Sg.

Kerajaan, north of Sangkulirang, *Kostermans 5778* (BO, K, L, SING); Sg. Wain region, N. of Balikpapan, *Kostermans Nos. 4301* (BO, K, L) and *4436* (BO, K, L, P, PNH, SING); Mentawir River region near G. Mentawir, Balikpapan District, *Kostermans 10148* (K, L) and *Sauveur 24* (L).

BRITISH NORTH BORNEO: Lahad Datu, Pulau Keruing, Sungei Kretam Besar, *Wood A4792* (K, KEP, L, SAN, SING); Cpt. 8, Sepilok F.R., *Nicholson & Charrington SAN 17749* (BO, L, SING) & *Nicholson & Patrick Ping Sam SAN 17682* (BO, L, SING); Cpt. 14, Sepilok F.R., *Wood A1997* (K, KEP, L, SAN, SING) and Cpt. 17, *Kadir A988* (BO, CANB, K, KEP, SAN, SING); the following Kabili—Sepilok F.R., Elopura, *Enchai* and *Enggoh Nos. 10377* (K, L) and *49151* (KEP); *Kadir F. D. 10219* (K, L); *Majuyap Nos. 10169* (K, L) and *48943* (KEP) and *Valera 1858* (K, L, PNH); the following Sandakan:— Bettotan, *Kloss S.F.N. 19186* (BO, NY, SING, UC); Batu Lima, *Ramos 1530* (A, BM, BO, BRI, K, PNH, UC, US); Sebuga near Sandakan, *Ramos Nos. 1278* (A, K, NY, SING); *1664* (A, BM, BO, BRI, K, L, P, UC, US); *1729* (A, BM, BO, BRI, K, L, P, PNH, UC, US) and *1902* (A, NSW, NY); Batu Lapan, (*D. D. Wood*) *Puasa 1985* (BO, UC).

PULAU NUNUKAN: Northern part, *Kostermans Nos. 8636* (BO, K, L, SING) and *9121* (A, BO, K, L, SING).

DISTRIBUTION: Sumatra and Borneo.

TYPE MATERIAL: *K. latifolia* Warb. *Beccari 1991bis* (FI, K); *Forbes Nos. 2997* (A, BM, CAL, FI, K, L, LE, UC) and *3188* (BM, CAL, DD, K, L, LE). *K. nitida* Warb., *Ramos 1530* (A, BM, BRI, K, PNH holotype, UC). *K. umbellata* Warb., *Beccari 1824* (FI holotype, K); *K. winkleri* Merr., *Winkler 2390* (G, K, L, PNH holotype, SING).

VERNACULAR NAMES: *Lohi* (British North Borneo).

This species is distinct from all the others in having only 3 anthers, one at each angle of the triangular staminal disc. Merrill describes it as having 6 anthers, 2 at each angle of the disc, but if the pollen sacs have dehisced, there is the appearance of two anthers. Other distinctive features are the strongly ridged or almost winged fruits on rather slender stalks and the glossy, reticulate,

chocolate-brown upper surface of the dried leaves. As regards its systematic position, there is some alliance with *K. curtisii* (Group 5) on account of the triangular staminal disc, the sessile anthers, the position of the bracteole, the sessile, few-lobed stigma and the rather similar ridged fruit. I have, however, placed it in a group of its own (Group 6) next to *curtisii* on account of the reduction in the number of anthers, in this case three only. It will be seen that *Ramos 1530* and *Winkler 2390*, holotypes of *nitida* and *winkleri* in PNH, collected in British North Borneo, were not destroyed as most of the PNH types were. It seems that the specimens of Ramos collected in North Borneo survived the fires of the 1939–45 war, but his Philippine specimens in Herb. Manila were destroyed. I was glad to see other specimens of his in Manila from North Borneo including some types of *Annonaceæ*, which have escaped the conflagration. The above types of *nitida* and *winkleri* including some *Annonaceæ* are holotypes and not merely isotypes as they have attached manuscript drawings and descriptions in Latin and English made by Merrill himself, accompanying the specimens. See also under *K. laurina* where the PNH duplicate of *K. oblongata* Merr., collected by Ramos in N. Borneo (*Ramos 1663*) is a holotype.

(20) **Knema laurina** (Bl.) Warb. Monog. Myrist. (1897) 606 t. 24 f. 1–3 [includ. vars *malayana* Warb.; *borneensis* (Miq.) Warb.; *bancana* Warb. et var. *amboinensis* Warb. l.c. 607—**syns. nov.**]; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 248; Koorders, Exkursionsflora v. Java 2 (1912) 258; Ridley, Fl. Mal. Pen. 3 (1924) 72; Sinclair in Gard. Bull. Sing. 16 (1958) 329 f. 19.

Basionym: Myristica laurina Bl. Rumphia 1 (1835) 189 t. 61; A.DC. Prodr. 14, 1 (1856) 206; de Vriese, Pl. Ind. Bat. Orientalis (Pl. Reinwardt.) (1857) 96; Miq. Fl. Ind. Bat. 1, 2 (1858) 70 et Suppl. (1861) 385; Hk.f. Fl. Br. Ind. 5 (1886) 112; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 319 pl. 156; Koorders et Valeton, Med. Lands Pl. Tuin 17 (1896) 186. *M. laurina* Bl. var. *amboinensis* (Warb.) Boerl. in Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt.*

Synonyms: M. tomentosa Thunb. sensu Bl. Bijdr. 2 (1825) 577 non Hk.f.et Th. *M. laurina* Bl. var. *longifolia* Miq. Fl. Ind. Bat. 1, 2 (1858) 71 et Suppl. 385. *M. laurina* Bl. var. *borneensis* Miq. in Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 51. *M. laurina* var. *bancana* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt. M. laurina* Bl. var. *malayana* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt. M. cantleyi* Hk.f. Fl. Br. Ind. 5 (1886) 110 non sensu King nec. aliorum. *M. furfurascens* Gandoger in Bull. Soc. Bot. France 66 (1919) 226 in clavi.

K. conferta (King) Warb. var. *tonkinensis* Warb. Monog. Myrist. (1897) 581; Lecomte in Not. Syst. 1, 4 (1909) 101 et in Fl. Gén. de L'Indo-Chine 5 (1914) 104—**syn. nov.** *K. elegans* Pierre Msc.* ex Warb. Monog. Myrist. (1897) 615; Lecomte in Not. Syst. 1, 4 (1909) 101 et in Fl. Gén. L'Indo-Chine 5 (1914) 106—**syn. nov.** *K. glauca* (Bl.) Warb. var. *nicobarica* Warb. Monog. Myrist. (1897) 596 excl. *King 536*—**syn. nov.** *K. oblongata* Merr. in J. As. Soc. Str. Br. 85 (1922) 190. *K. obovoidea* Merr. in Univ. Calif. Publ. Bot. 15 (1929) 75. *K. tridactyla* Airy Shaw in Kew Bull. 1939 No. 10 (1940) 543—**syn. nov.**

BURMA LOWER BURMA: Mergui, *Lace 4801* (DD, K).

NICOBARS: *Kamphøvener 2804* (C); *Kurz s.n.* (BM, CAL, MEL) and *Kurz 26088* (K).

INDO-CHINA NORTH VIETNAM (TONKIN): Mt Bavi, *Balansa Nos. 4175* (K, P); *4176* (K, P) and *4199* (BR, G Boiss, K, L, P).

CENTRAL VIETNAM (ANNAM): Pron Sapoum, near Agricultural Station of Blao, Prov. Haut Donnai, *Poilane 23677* (P, SING); Nui Bach Ma Station, Central Vietnam near Hue, *Poilane Nos. 27815* (P, SING) and *28917* (P, SING) nd *Vidal Nos. 790* (P) and *791* (P); Poste 6, Prov. Quang Nam, *Poilane 29454* (P, SING); Mts of Mam Ray, Prov. Kontum, *Poilane 18219* (P, SING); Nha-Trang, (Tourane) *Clemens 3467* (A, BM, G, K, P, UC).

CAMBODIA: Mt Chereev, Prov. Somrong Tong, *Pierre 5432* (BO, CAL, K, K, LE, P.)

SIAM EASTERN DIVISION: Bukanum, Korat (= Nakawn Rachasima) *Kerr 9849* (BM).

SOUTH-EASTERN DIVISION: Trad, Huay Raeng, Dong Madua, *Smitinand 1357* (BKF); Nawng Kai Ploi, Sriracha, *Kerr 2120* (BM, CAL, K, L); Bandan, Sriracha, *Marcan 1386* (BM).

SOUTH-WESTERN DIVISION: Kao Ri Yai, Kanburi, *Kerr 10423* (BM).

PENINSULAR DIVISION: Tasan, Surat, *Kloss 6936* (K); Chawng, Trang, *Kerr 15156* (BK, BM); Klawng Wa, Kraburi, *Kerr 16326* (BM, BK); Kao Pawta, Chondong, Ranawng, *Kerr 16818* (BK, BM); Pulau Adang, Satul, *Kerr 13990* (BK, BM).

* *Myristica elegans* Pierre Msc.

SUMATRA s.l.: *H.B. 3056* (BO).

Tapanuli: Si Hare-hare, Div. Padang Si Dimpuan, subdiv. Padang Lawas, *Rahmat Si Toroes 4413* (A, L, NY, UC, US); Si Hare-hare, Djai, Padang Lawas, *Rahmat Si Toroes* 5027 (A, L, NY, UC, US).

West Coast: Pulau Pisang, Padang, *Teijsmann 484* (BO, U) and *Teijsmann s.n.* (K, LE); Taram, East of Pajakumboh, River Tjampo, *Maradjo 279* (L).

East Coast: Pulau Berhala, *Wyatt-Smith K.F. Nos. 76413* (KEP) and *76456* (KEP) and *v.d. Meer Mohr 82* (BO); Aer Kandis near Rantau Parapat, Bilia, *Rahmat Si Toroes 2411* (A, NY, US); vicinity of Lumban Ria, Asahan, *Rahmat Si Boeea 7414* (A, US); Tor Matutuna, Asahan, *Rahmat Si Boeea 9539* (A, L); Sibolangit, *Lörzing 5538* (BO, BR, G Boiss., K, L, P, SING, U); B. Longkat, B. Lambosa, *bb9160* (BO).

Palembang: Ogan Ulu, *Teijsmann 3718* (BO, CAL, U); Rawas, *Grashoff 1148* BO, L); Muara Enim, *Teijsmann 3689* (BO, U); Batu Pantjeh, Musi, *Forbes 2683* (A, BM, FI, L, LE, P, SING).

Lampong: Kotta Djawa, *Forbes Nos. 1306* (BM, CAL, LE) and *1409* (A, BM, CAL, FI, L, LE, P, SING).

Pulau Simalur: *Achmad Nos. 63* (BO, L); *643* (BO); *1195* (BO, CAL, L, P, SING) and *1808* (BO, K, L).

Pulau Siberut: *Kloss S.F.N. 13092* (BO, K, SING); *Iboet 178* (B, BO, K, L, SING).

Pulau Enggano: Boea-boea, *Lütjeharms 4421* (A, BO, K, L, P, SING, US).

Banka: Lobok Besar, *Kostermans & Andong 5* (BO, K, L, P, PNH) and *Kostermans & Anta 1181* (BO, K, L, P, PNH, SING); Sungei Liat, *Teijsmann s.n.* (BO).

Billiton: Tanjong Pandan, *Teijsmann s.n.* (BO).

MALAY PENINSULA: All provinces except Perlis and Prov. Wellesley. For list see Gard. Bull. Sing. 16 (1958) 331. Additional records:— Pulau Jarak, *Wyatt-Smith K.F. Nos 76413* (KEP) and *76456* (KEP).

JAVA s.l.: *Blume s.n.* (A, BR, K, L, MEL, NY, P, PDA, S) as *M. laurina; Blume 24* (CAL); *Blume 54* (L) as *M. tomentosa; Blume* 1629 (L) as *M. laurifolia* Bl. *nom. nud.; Blume s.n.* (L, NY) as *M. tomentosa; Hasselt s.n.* (L); *Horsfield 1 bis* (BM,

CGE, K); *Junghuhn s.n.* (L, U); *56* (K); *57* (L); *560* (K, L); *716* (L); *Junghuhn. date 1855* (LY); *Kollmann, date 1838* (NY); *Kuntze 4996* (NY); *Teijsmann & de Vriese, date 1859–1860* (L); *de Vriese 47* (L); *de Vriese s.n.* (CAL , K); *Zollinger Nos. 825* (FI); *996* (A, CAL, FI, G & Prodr., K, L, LE, P) and *998* (G. Boiss.).

West Java: Tjimara, Udjong Kulon, *Koorders 5260* (BO, CAL, L); Pasir Orai, Kosala, Bantam, *Forbes 295* (BO, CAL); Zibadui, Kosala, *Forbes 545a* (BM, BO, CAL, FI, LE); Lebak, Bantam, *Kohl & Hasselt s.n.* (L); Bantam, *Spanoghe s.n.* (L); G. Angsana, Djaunga, *Backer 10022* (BO); Pasir Tjihidung, Batavia, *Dakus 205* (BO, BRI, L, U); Djasinga Estate, Dungun Iwul, *v. Steenis 11200* (A, BO, L, SING); the following Depok:—*Bakhuizen v.d. Brink 896* (BO); *Hallier, 1st Sept., 1896* (BO, K, L, U); *Hildebrand 8* (BO); *Koorders Nos. 24031* (BO, L); *31018* (BO, U); *33419* (BO, L); *33441* (BO, K, SING); *40511* (BO); *42239* (BO) and *42783* (BO); *Drs. V. Leeuwen & J. J. Smith 545* (BO); Nature Reserve, Depok, *v. Steenis Nos. 2842* (BO); *12614* (BO); *12615* (A, BO, K, L, SING) and *Soegandiredja 274* (BO, L, SING); near Depok, *Schiffner 1980* (L); east of Depok, *Backer No. 23197* (BO); Tji Lodong, east of Depok, *Backer 31193* (BO). The following three Bogor:—West of Sodeng, Djambu, *Backer 23135* (BO); G. Andan, *Bakhuizen v.d. Brink 5287* (BO, L) & G. Wiru, *Bakh. v.d. Brink 7793* (BO). The following four Tjampea, G. Tjibodas:—*Bijhouwer 268* (BO); *Hallier 766* (A, BO, G Boiss., K, L, P, SING, U, W); *Drs. v. Leeuwen 2285* (BO) and *v. Steenis 654* (BO); G. Tjiputi, Tjampea, *Bakh. v.d. Brink 4208* (BO, K, L, P, UC); G. Parungpung, *Bakh. v.d. Brink Nos. 613* (U) and *4178* (BO, L, SING); Pelabuanratu, Preanger, *Koorders Nos. 5250* (BO, L,) and *5251* (BO, K, P); Lengkong, *Drs. v. Leeuwen 2873* (BO, SING); Sukabumi, *Koorders 5256* (BO); Biak Denu, Tjipatudja, *Backer 8835* (BO, SING).

Mid Java: Madjenang, *Backer 18581* (BO); Pringombo, Banjumas, *Koorders Nos. 5274* (BO); *5275* (BO, K, UC); *1197* (BO, K, L,); *33939* (BO) and *37501* (BO, P); Sempor, Gombong, Kedu, *Brinkman 760* (A, BO, K); Wonosobo, Trimuljo, *Ja 2502* (A, BO, L).

NUSA KAMBANGAN: *Koorders Nos. 5277* (BO, L); *5280* (BO, K, L); *26936* (BO, K, L, SING) and *26942* (BO, K, L, P); K. Babakan, *Kostermans & v. Woerden 85* (BO).

BORNEO SARAWAK: Matang, *Beccari 1546* (FI, G, K, M, P, S); *aviland 634* (K) and *Hullett 793* (SAR, NG); Lio Matu, Upper Baram, *Moulton S.F.N. 6722* (BO, K, PNH, SING); R. Kenaban, Upper Plieran, *Pickles SAR Nos. 3405* (SAR, SING) and *3477* (SAR, SING) and *SAR 3611* SAR, SING); near Long Kapa, Mt Dulit (Ulu Tinjar) 4th Division, *Richards 1220* (A, K, SING).

BRUNEI: B. Mering F.R., *Sow K.F.N. 80161* (BO, K, KEP, L, SING); Kuala Belalong, Temburong, *Ashton, Smythies & Wood SAN 17085* (BRUN, L, SAN, SING).

WEST BORNEO: Batu Ampat, Pontianak, *bb13727* (BO); Pulau Lemukutan, *Hallier 323* (BO, L) and another collection *Hallier 323* as *cinerea* var. *sumatrana;* Sungei Sambas, *Hallier 1084* (BO, SING).

SOUTH AND SOUTH-EAST BORNEO: Gunong Sakumbang, *Korthals s.n.* (L, LE, U); G. Pamatton, *Korthals (25)* (CAL, K, MEL, S, U).

EAST AND NORTH-EAST BORNEO: West Kutei, No. 12, Lihan Batu Beng, *Endert 2281* (A, BO, K, L); No. 19, L. Puhus, *Endert Nos. 2436* (BO, K, L, P, PNH, SING) and *4932* (A, BO, K, L, SING); Segoi River, *Kostermans 9667* (K, L); P. Sangkulirang, E. Kutei, *Kostermans 4831* (BO, K, L, P, PNH, SING); Peak of Balikpapan, *Kostermans 7367* (BO, K, L).

BRITISH NORTH BORNEO: Sebatik Island, St. Lucia, Tawau, *Cuadra A2407* (K, KEP, L, SAN, SING); Tawau, *Elmer 21017* (A, BM, BO, BR, C, G, K, L, M, NY, P, PNH, SING, U, UC); Batu Mapan, Tawau, *Maidin 4145* (K, L, SAN); G. Magdalen, Tawau, *Kapis & Michael Wong, SAN 17260* (L); Pulau Keruing, S. Kretam Besar, Lahad Datu, *Wood A4787* (KEP, L, SAN, SING); Kretam Jungle, *Mendoza 4291* (K, KEP, SAN); Kinabatangan, *Evangilista 949* (A, NY); the following Sepilok Forest:— Cpt. 9, *Melegrito A4247* (K, KEP, L, SAN, SING); Cpt. 10, *Wood*

SAN 16012 (KEP, L, SING); Cpt. 13, *Sinclair 9291* (A, B, E, K, L, M, SAN, SING); Segaluid, Elopura, Sandakan, *Cuadra 1110* (BO, K, KEP, PNH, SAN, SING, US); Bettotan near Sandakan, *Kloss S.F.N. 19002* (BO, BRI, NY, SING, UC) and *Valera 3816* (K, L); Batu Lima, Sandakan and vicinity, *Ramos 1433* (A, K, L, P, PNH, US); Sibaguey, Sandakan, *Ramos 1663* (A, BM, BO, BRI, K, L, PNH, UC, US); Sandakan, *Ramos 1721* (A, K, L, US) and *1757* (A, BM, BO, L, NY, NSW, US) and *Agama 1003* (A, K, L); Gompa, Kudat, *Balajadia 4054* (K, SING); Ranau-Poring Road, 4th mile, *Sinclair 9282* (L, SAN, SING); Bukit Tenom, 2mls. West of Tenom, *Wood & Wyatt-Smith A4400* (KEP, L, SAN, SING); 6 mls. S.S.E of Malaman, Sipitang, *Wood SAN 16815* (KEP, L, SAN, SING); Tambunan, *Wood & Wyatt-Smith K.F.N. 80439* (KEP, SAN, SING).

NATUNA ISLANDS: P. Bunguran, G. Ranai, *v. Steenis 1349* (B, BO, L, SING).

KARIMATA ISLANDS: P. Karimata Besar, *Mondi 205* (BO, K, L, SING, U).

PULAU NUNUKAN: Northern part, *Kostermans Nos. 8903* (BO, K, L, P, SING); *8948* (BO, K, L, SING) and *8950* (BO); *W. Meijer Nos. 2081* (BO, L); *2094* (BO, K, L); *2161* (BO, K, L, SING) and *2184* (BO, K, L, P, PNH, SING); *Paymans 52* (K, L).

CULTIVATED: All cultivated in Hort. Bog. *Beccari Nos. 7778* (FI); *7778a* (FI) and *7779* (FI) as *K. laurina;* origin Banka, *Beccari 7780 = 632* (FI) as *K. laurina* var. *bancana = (K. candollei* Warb. *nom. nud.*); *Beccari Nos. 7781* (FI) and *7781a* (FI) as *K. laurina; Beccari s.n.* (FI); *7782* (FI) and *7782a* (FI) as *K. laurina* var. *amboinensis* Warb., origin cannot be Ambon as stated but is probably Banka; *Teijsmann, date 1867* (MEL); *Warburg Nos. 1738* (L, LE, M) and *2499* (C, G Boiss.).

DISTRIBUTION: Lower Burma (Mergui), Nicobars, Indo-China, Siam, Sumatra including Banka and Billiton, Malay Peninsula, Java except East Java, Borneo.

TYPE MATERIAL: *Myristica laurina* Bl., Java and Nusa Kambangan, *Blume s.n.* (A, BR, CAL as 24, K, L, MEL, NY, P, PDA, S). *K.*

laurina (Bl.) Warb. var. *amboinensis* Warb. Cult. Hort. Bog. (origin cannot be Ambon as stated), *Beccari s.n.* (FI holotype); *Beccari 7782* (FI) and *7782a* (FI) the numbered specimens must be part of the type collection but *Beccari s.n.* quoted by Warb. and having the words *K. laurina* var. *amboinensis* written on it is the actual holotype. Var. *bancana* Warb. *Beccari 7780* = *632* (FI) = *K. candollei* Warb. *nom. nud.*). *M. laurina* var. *borneensis* Miq. Sakumbang, *Korthals s.n.* (L, LE, U) and *Pamatton, Korthals s.n.* (CAL as 25, K, MEL, S, U). *M. laurina* var. *longifolia* Miq., Pulau Pisang, Sumatra, *Teijsmann s.n.* (K, LE) and *Teijsmann 484* (BO, U), this is probably all one collection. Var. *malayana* Warb., see the several Nos. quoted in Warb. page 609. *M. tomentosa* Thunb. sensu Bl. Java and Nusa Kambangan, *Blume s.n.* (L, NY) and *Blume (54)* (L). *M. cantleyi* Hk. f., *Cantley 195* (K). *M. furfurascens* Gandoger, *Junghuhn, date 1855,* Java (LY). *K. conferta* (King) Warb. var *tonkinensis* Warb. *Balansa Nos. 4176* (K, P) and *4199* (BR, G Boiss., K, L, P). *K. elegans* Pierre ex Warb., *Pierre 5432* (BO, CAL, K, LE, P holotype). *K. glauca* (Bl.) Warb. var. *nicobarica* Warb., *Nicobars, Kurz s.n.* (BM, CAL, MEL) and *Kurz 26088* (K) syntypes, probably all one collection, but excluding *King 536. K. oblongata* Merr., *Ramos 1663* (A, BM, BO, BRI, K, L, PNH holotype, UC, US). *K. obovoidea* Merr., *Elmer 21017* (A, BM, BO, BR, C, G, K, L, M, NY, P, PNH, SING, U, UC). *K. tridactyla* Airy Shaw, *Richards 1220* (A, K holotype, SING).

VERNACULAR NAMES: *Luat khwai* (Siam); *piangu pipit* (Sumatra); *ekor andjing* (Banka); *sapie* (Java).

I pointed out in Gard. Bull. Sing. 16 (1958) 332 that *K. laurina* is a polymorphic species with numerous forms which grade into each other. Had it been a species of economic value, we would have had, through breeding and selective cultivation, many more races and endless forms. *K. oblongata* and *obovoidea* from Borneo have larger flowers than the Javanese, Sumatran, Malayan and other Bornean forms but I have also united them with *laurina* as they grade into each other. The following is an additional character which may be useful in distinguishing sterile material of *laurina* from *conferta:*—The apices of the twigs in *laurina* are not or very seldom striate. They may be striate lower down in older twigs. In

conferta they are usually striate at the apex as well as lower down. Certain so-called varieties of *K. laurina* have been placed under *K. tomentella* (see there).

After making the keys, I found that I could not separate *K. tridactyla* Airy Shaw from *laurina.* It is represented only by a single gathering with very young male flowers, which are exactly of the same structure and with the same number of anthers as *laurina.* Here the size of the flowers is misleading, and on account of their size, one may not at first sight see the connection between this so-called *tridactyla* and *laurina.* (See note under immature material in the introductory part). The leaves are narrower than in typical *laurina,* but this may be due to the altitude and the habitat for *tridactyla* was collected on a ridge 300 m. high on Mt Dulit in Sarawak by Richards.—*Richards 1200* (A, K, SING). It is connected by a series of intermediate forms to typical *laurina* and the whole resemblance will be much clearer when these are examined. It also resembles *K. globularia* because of its narrow leaves, but that species has glabrous leaves and does not occur in Borneo.

The intermediate forms are as follows:—

(1) *Wood & Wyatt-Smith SAN 4400*—almost typical *laurina* with leaves dull above, but reticulations fainter than in *laurina.*

(2) *Cuadra A1100*—nearly typical *laurina* except that the leaves are glossy above and the reticulations are fainter.

(3) *Pickles SAR 3477*—large leaves with an acute base, upper surface slightly glossy, reticulations faint; lower surface ashy-grey, (i.e. of the same colour as *tridactyla*) and sparsely tomentose.

(4) *Endert 4932*—leaves narrower than in *laurina;* glossy above with faint reticulations, tomentum sparse, base generally acute. Here there is a closer approach to *tridactyla.*

(5) *Wood & Wyatt-Smith K.F.N. 80439*—very similar to *tridactyla.* I had already named it *tridactyla.* The leaves are glossy above with faint reticulations and sparse tomentum, about the same width as *tridactyla,* but not so long. A few of them are about the same size as the smallest leaves of *tridactyla.* The flowers are those of typical *laurina,* larger than those of immature *tridactyla,* but still not quite mature. Of this series (4) and (5) are closest to *tridactyla* especially (5), while (1) is closest to *laurina.*

(21) **Knema linifolia** (Roxb.) Warb. Monog. Myrist. (1897) 558 t. 24 f. 1–3.

Basionym: Myristica linifolia Roxb. Fl. Ind. 3 (1832) 847.

Synonyms: M. longifolia Wall. ex Blume, Rumphia 1 (1835) 188; Hk.f.et Th. Fl. Ind. 1 (1855) 156 (excl. sp. malayan.=*K. furfuracea*); A.DC. Prodr. 14 (1856) 204 excl. sp. malayan.; Miq. Fl. Ind. Bat. 1, 2 (1858) 69 excl. sp. malayan.; Hk.f.et Th. Fl. Br. Ind. 5 (1886) 110 excl. var. *erratica;* Kurz, For. Fl. Br. Burma (1877) 283; Gamble, Man. Ind. Timbers (1881) 314; Clarke, "Plants of Kohima in Muneypore", in Journ. Linn. Soc. 25 (1889) 62; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 324 pl. 164 and 166. *M. clarkeana* King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 325 pl. 165. *K. linifolia* var. *clarkeana* (King) Warb. Monog. Myrist. (1897) 561.—**syn. nov.**—**Fig. 17.**

Tree 10–20 m. high. *Bark* rough, greyish-brown with horizontal wrinkles and light vertical fissures; sap red. *Twigs* rusty-tomentulose at the apex, lower down striate, glabrous and pale grey, bark not cracking. *Leaves* coriaceous, lanceolate, oblong-lanceolate or occasionally oblong-elliptic, glabrous and shining above, somewhat glaucous beneath, apex acute, base acute, rounded or sub-cordate; main nerves 25–35 pairs, prominent on both surfaces; reticulations distinct on both surfaces; length 15–40 cm.; breadth 7–13 cm.; petiole 1.5–2 cm. long. *Male flowers* obovoid or pyriform, tomentose outside, red inside, 7 mm.–1 cm. long and 5–6 mm. broad, the perianth segments thickened at the tips inside; pedicels 1.2–1.5 cm. long with the bracteole median or below the middle, occasionally at the base of the flower; disc flat with 13–18 sessile anthers; stalk of disc 3.5 mm. long, striate. *Female flowers* 6 mm. long with shorter, 5–6 mm. long pedicels; ovary broadly ovate, rusty-tomentose, 3 mm. long, tapering into a short, 1.5 mm. long style; stigma bi-lobed. *Fruit* solitary or in clusters of 2–3, ellipsoid or ovoid, very shortly stalked or sessile, rusty-tomentulose to tomentose, 2.5–3.5 cm. long and 2.2 cm. broad.

INDIA S.L.: *Griffith 282* (A).

BENGAL: N. Bengal, Topgow, *K. Biswas 2064* (A); Jalpaiguri, Tondu, Duars, *Haines 443* (CAL, DD, E, K).

SIKKIM (EAST HIMALAYA): Jerai, Dulkahar, Darjeeling, *Gamble Nos. 483b* (DD); *483d* (BM, K) and *483g* (DD); the remainder Sikkim:—*King Nos. 2346* (CAL) and *5084* (LE) and *date 1878* (BM, CAL, DD); *Thomson,*

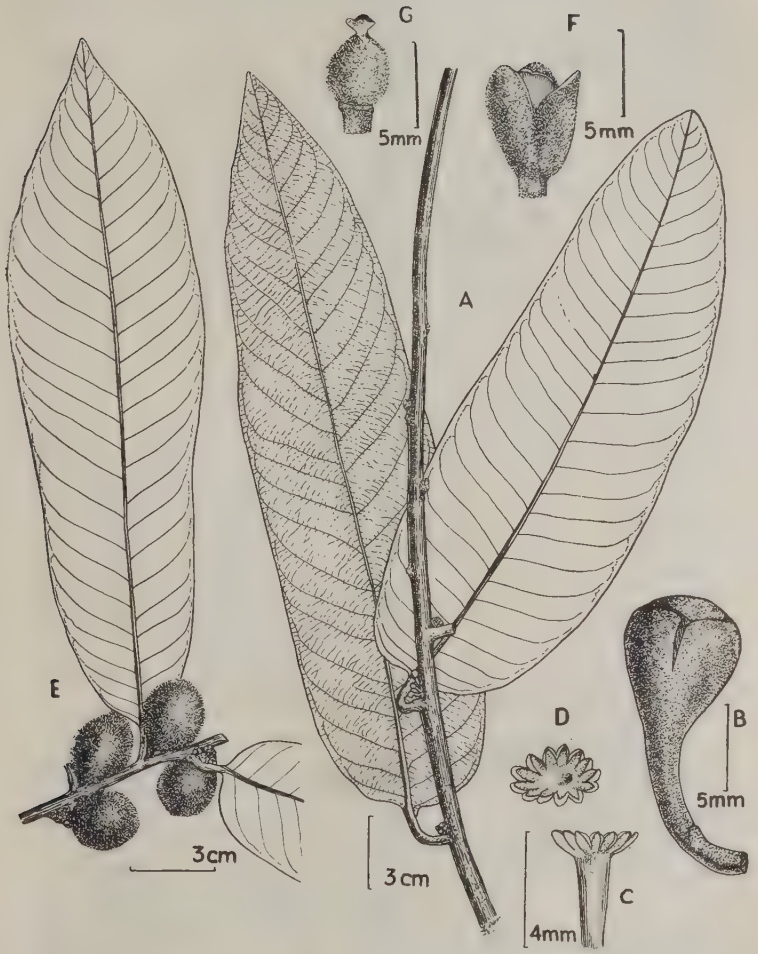


Fig. 17. *Knema linifolia* (Roxb.) Warb.

A, twig with leaves and male flowers. B, male flower enlarged. C–D, staminal column. E, fruit. F, female flower enlarged. G, ovary and stigmas. A–D from *Wallich 6801* (W). E from *Maung Ba Pe 11678* (DD). F–G from *Roger 816* (DD).

date 1857 (K); Kalijhora, *Ribu & Rhomoo 4087* (CAL); Birick, *Cave, 1st May, 1912* (E); Tista, *Cave 19th April, 1916* (E); Mongpu, *Cave, 19th May, 1917* (E); *Clarke 36267* (CAL).

ASSAM: S.l., *Griffith s.n.* (CAL, K, LE, P); *Jenkins s.n.* (BO, CAL, DD, E, K, L, M, P, PDA); *Masters 1400* (CAL, L) and *Masters (Herb. Pierre 5461)* (P); *Prain s.n.* (CAL); *Simmons s.n.* (DD); Garo Hills, Jura Peak, *Mann, Dec. 1885* (CAL, PDA); the following 7 Khasi (Khasia) and Khasi Hills:—*Hk. f. et Th. 126* (L) and Khasia & [Chittagong] *Hk. f. et Th. s.n.* (BM, CAL, CGE, E, G, K, L, LE, M, P, W); Nungpo, *Clarke 40679E* (BM, CAL, E, FI, LE); *Kurz s.n.* (CAL); Coll. initials not clear *333* (CAL, LE); Sylhet, *Wall. Cat. 6801* (A, BM, BR, CAL, CGE, DD, E, G and Prodr. & Boiss., K, L, LE, M, P, PDA, W); Guliang Village, Sylhet, *U. Kanjilal 4705* (CAL, DD); the following 3 Naga Hills:—*Collett 98* (CAL); Jerighat, *Jagermani 495* (A, DD) and Dandobhin Nodu, *Prain 680* (A, CAL); Sibsagar, *Peal 90* (CAL) and *142* (CAL); Dibrughar, *Masters 1122* (CAL); Rotung, Abor Hills, *I. H. Burkill 37607* (CAL); Manipur, *K. Biswas 4987* (CAL) and *Clarke 42324A* (BM, CAL, FI, LE); Umsaw Forest, *K. Biswas 3766* (CAL) and *Shri Ram, 24th April, 1935* (DD); Lushai Hills, *Prazer 7890* (CAL); 15 mls. S.E. of Lungleh, S. Lushai Hills, *Gage 152* (CAL, DD); Duffla Hills, *Lister 336* (CAL).

EAST PAKISTAN

EAST BENGAL: All Chittagong:— *Hk. f. et Th. Nos. 128* (L); *566* (K); *1038* (P) and *s.n.* (A, C, CAL, E, FI, G and Prodr., K, L, M, PDA, W); *King Nos. 125* (L) and *412* (BO, DD, CAL, L, PDA); *Lister 74* (CAL, L); *Roxburgh 252* (BM); Mainmukh, Chittagong Hill Tracts, *Dent 94* (DD); Rangamati, Chittagong Hill Tracts, *Gamble Nos. 7940* (LE) and *7941* (CAL, DD, K, L, LE); Chittagong Hill Tracts, *King Nos. 97* (CAL, K); *496* (CAL, K) and *date 1885* (FI); *Lister Nos. 47* (CAL); *382* (BM) and *s.n.* (LE); near Chittagong, *Cowan 2* (E); Pharoha, *Gamble Nos. 6761a* (DD) and *6761c* (DD); Kodala Hill, *King 605* (BM, CAL, K); Hazarikhil, *Rao 5644* (DD).

BURMA: S.l., *Griffith 4345* (C, CAL, K, LE, M, P, U, W) and *A. Roger 816* (DD); Taram Tam, Upper Burma, *Toppin 6032* (CAL); Mawraw Chaung, Myitkyina, *Parkinson 392* (DD, K); Mamma-Namun, Buna, Myitkyina, *C. G. Rogers 826* (CAL, DD, E); near Bhamo, Katha District, *Haines, March 1915* (K); Mawlu Chuang, Katha District, *Maung Thy 2371* (DD); Arakan, *Kurz s.n.* (CAL); Boronga Island, Arakan, *Kurz, 10th Oct., 1869* (K); Zalok-gyi, Pyinmana, *Ba Pe 11678* (DD); Toukgeghat, Pellowa Zeuk, *Kurz Nos. 985* (CAL, M) and *2433* (L); Karen country, *Kurz 2432* (CAL) and *s.n.* (BO); Papun, *Meebold 17027* (CAL); Thaton District, Paingkyu to Tale, E. side of Dawna Range near Tale, *Lace 4649* (DD, E, K); Moulmein, *Falconer 546* (CAL); Chamgbya, Amherst District, *Parkinson 5012* (DD); Zimba Valley, Tavoy, *Parker 2237* (DD); Kaleinaung Reserve, Zimba Chaung, Tavoy, *Ba Pe Nos. 842* (CAL, DD) and *845* (CAL); Wagon, Tenasserim, *Meebold 15182* (CAL).

INDO-CHINA CENTRAL VIETNAM (ANNAM): Poste 6, Prov. Quang, *Poilane 29527* (SING, P).

SIAM NORTHERN DIVISION: Mae Ang, Lampang, *Winit 1577* (BKF).

NORTH-EASTERN DIVISION: Loei, Phu Krading, Samkhae, *Din 204* (BKF).

DISTRIBUTION: India (E. Himalaya, Assam, N. Bengal), E. Pakistan (Chittagong), Burma, Indo-China, Siam.

TYPE MATERIAL: *Myristica linifolia* Roxb. *Roxburgh 252* (BM holotype). *M. longifolia* Wall. ex Bl., *Wall. Cat. 6801* (A, BM, BR, CAL, CGE, DD, E, G and Prodr. and Boiss., K holotype, L, LE, M, P, PDA, W). *M. clarkeana* King, *King Nos. 97* (CAL, K); *412* (BO, DD, CAL, L, PDA); *496* (CAL, K); *605* (BM, CAL, K) and *Peel 90* (CAL).

VERNACULAR NAMES: *Tagling-asing* (Abor); *se* (Manipur); *tringthi* (Lushai); *garo-bhala* (Assam); *dieng-soh-langor-skri; dieng soh-slung; dieng-tyrkhou* (Khasi); *duing-kim-chi-ching* (Naga); *bolanchi* (Garo); *meik-ya-naing* (Shan States); *za-deip-hpo* (Burmese); *chro-ta* (Annam).

USES: Wood used for house building. Juice caustic. Sap and smoke often produce sores.

There is some variation in the shape and size of the leaves. They may be acute, rounded or sub-cordate at the base. Sterile forms with narrow leaves are often difficult to distinguish from *K. erratica* which occurs in the same area. The flowers too, vary in size and length of pedicel. The fruit varies in indumentum from tomentulose to tomentose. It is generally, however, tomentose. I have included var. *clarkeana* in *linifolia* since it very similar to *Roxburgh 252*, the type of the species from Chittagong.

The leaves resemble those of *K. furfuracea* when they are sub-cordate, but the bark of the twigs is not fissured as in that species and (the stigma is bi-lobed, not several-lobed.

(22) **Knema malayana** Warb. Monog. Myrist. (1897) 570 t. 25 f. 1–2 [excl. syn. *K. corticosa* Lour. et *M. corticosa* (Lour.) Hk.f.et Th. sensu Hk.f.et Th.]; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 242; Ridley, Fl. Mal. Pen. 3 (1924) 69; Sinclair in Gard. Bull. Sing. 16 (1958) 293 f. 9.

Synonyms: Myristica glaucescens (Jack) Hk.f.et Th. Fl. Ind. 1 (1855) 157 excl. sp. typica et incl. *Griffith 4343* tantum; Hk.f. Fl. Br. Ind. 5 (1886) 111 quoad *Griffith 4343, Maingay 1280* pro parte et *Maingay 1299* tantum; King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 323 pl. 161 quoad *Griffith 4343, Maingay 1280* pro parte, *Maingay 1299* et *King, Wray* et *Ridley Nos. tantum. M. malayana* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 91 *nom. alt.*

SIAM PENINSULAR DIVISION:	Ban Bajo, Toh Moh, Pattani, *Lakshnakara 754* (BK, BM).
SUMATRA EAST COAST:	Vicinity of Huta Bagasan, Asahan, *Rahmat Si Boeea 7023* (A, US).
PALEMBANG:	Banjuasin & Kubestreken, *Endert 189EIP905* (BO, L); *Thorenaar 189EIP1006* (BO, L, SING); Lematang Ilir, *Thorenaar 91T3P251* (BO, SING); Lematang Ilir, G. Megang, *Thorenaar T683* (BO, L).
MALAY PENINSULA:	All provinces except Perlis, Penang, Prov. Wellesley, Pahang and Negri Sembilan. For list see Gard. Bull. Sing. 16 (1958) 294. Amend *Sinclair Nos. 40280; 40368* and *40717* to *K. communis*. New and first record for Kelantan:—Kampong Gobek, Kerilla Estate, *Mohd Shah & Kadim 535* (K, L, SING).
DISTRIBUTION:	Lower Siam, Sumatra, Malay Peninsula.
TYPE MATERIAL:	*K. malayana* Warb., Warburg's syntypes *Wray 176; King Nos. 5706; 6128; 8541* and *10594; Cantley 20; Griffith 4343* but excluding *Falconer*, Tenasserim, *Griffith 4349* and *Curtis*, Penang. See Gard. Bull. Sing. 16 (1958) 296.

Sterile and fruiting specimens of this species may at times be confused with *K. cinerea* var. *patentinervia* or with typical forms of var. *sumatrana*. *K. malayana* has thinner leaves than both these varieties. The nerves are similar to those of *cinerea* var. *patentinervia*, but not so oblique as those of var. *sumatrana*. The male pedicels are longer than those of either except those of var. *patentinervia* f. *longipedicellata*. The species is common in Malaya but rare elsewhere and absent in Borneo.

(23) **Knema mandaharan** (Miq.) Warb. Monog. Myrist. (1897) 553 t. 24; Sinclair in Gard. Bull. Sing. 16 (1958) 319 f. 16.

Basionym: Myristica mandaharan Miq. Fl. Bat. Suppl. 1 (1861) 384 et in Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 48.

SUMATRA s.l.:		*Korthals s.n.* (A, K, L, U); *de Vriese s.n.* (A, BO, L, LE, NY, S, W); *de Vriese* (*28*) (CAL, L) and (*66*) (L).
	ATJEH:	Taleengon, Redelong, *bb12270* (BO); Gajo Lueus, Gunong Agosan, *bb22410* (A, BO, L); Gajolanden, from biv. 7 via Ayer Panas to Ruma Bunder, *v. Steenis 10092* (A, BO, K, L).
	TAPANULI:	Karohoogvlakte, *bb6214* (BO, L); Sidikalang, Delleng, *bb15562* (BO, L).
	WEST COAST:	Sulike, Mangani, *bb7430* (BO, SING); Prov. Priaman, *Diepenhorst* (*Teijsmann 3091*) (BO, U); Nantigo near Mt Sago, Pajukumbuh, Central Sumatra, *W. Meijer 4075* (L, SING).
	EAST COAST:	Tongkoh, Karolanden, *bb Nos. 6823* (BO, L,); *7200* (BO) and *8634* (BO); Masihi F.R., Asahan, *Krukoff 4082* (A, BO, BR, BRI, G, L, LE, NY, SING, US); Sibolangit, Bander Baru, *Lörzing 4585* (BO, L).
MALAY PENINSULA:		Perak, Trengganu, Johore. For list see Gard. Bull. Sing. 16 (1958) 321.
DISTRIBUTION:		Sumatra and Malay Peninsula.
TYPE MATERIAL:		*Diepenhorst* (*Teijsmann 3091*) (BO, U holotype).

K. mandaharan grows in wet and dry places in lowland forest and up to 900 m. The specimens from the higher altitudes have somewhat smaller and narrower leaves, often with more distinct reticulations but otherwise there is no difference. It has not been found in Borneo and the specimens which I quoted in Gard. Bull. Sing. 16 (1958) 321 namely *Purseglove Nos. 4549* and *5367* and *Wood SAN 16709* do not belong here. The first two are *K. latericia* var. *lunduensis* and the other *K. latericia* var. *latericia*.

(24) **Knema membranifolia** Hubert Winkler in Engl. Bot. Jahrb. 49 (1913) 368.—**Fig. 18.**

Tree 15–20 m. high. *Bark* nearly smooth, pale brown, flaking in thin strips; sap yellowish-red. *Twigs* glabrous, pale grey, angled, slender and about 2 mm. thick at the apex, stout (4–5 mm. thick) lower down, the bark tending to crack slightly. *Leaves* thinly coriaceous, glabrous, drying yellowish-green above, paler beneath, oblong-lanceolate or less often obovate-lanceolate, apex acute or shortly acuminate, base acute, nerves 14–16 pairs, fine and raised on both surfaces as is the midrib, ascending gradually and interarching near the margins; reticulations fine above, slightly more prominent beneath, mostly scalariform, forming a lax network; length 12–25 cm.; breadth 4–7 cm.; petiole 1.5–2.5 cm. long. *Male flowers* numerous on tomentose, 2 mm. long tubercles; pedicels 8 mm.—1 cm. long with a median bracteole; perianth triquetrous in bud, depressed in the centre when dry, glabrous, 8 mm. in diam., split nearly half-way by the lobes, yellow outside, pink inside; staminal disc circular, 3 mm. across, flat or slightly convex, stalk less than 1 mm. long; anthers 18–23, elongated, well-spaced, sessile. *Female flowers* unknown. *Fruit* obovoid, obtuse at the apex, at first minutely furfuraceous, soon glabrous, 3–3.4 cm. long and 1.6–2 cm. broad, sessile or on a very short, stout, 3–5 mm. long stalk.

BORNEO SARAWAK:	Gunong Gading, *Daud & Tachun, S.F.N. 36113* (SAR, SING); Mt Merinjak, *Sadong, Native Collector 2648* (A, K, PNH, US).
BRUNEI:	North slopes of Bukit Patoi, Temburong, *Ashton, Smythies & Wood SAN 17127* (BRUN, K, L, SAN, SING).
SOUTH AND SOUTH-EAST BORNEO:	Hayup, *Hubert Winkler 2460* (BM, BO, BRSL, G, K, L, P, PNH, SING) and *2546* (BM, BO, BRSL, G, K, L, SING).
EAST AND NORTH-EAST BORNEO:	Sepaku, Balikpapan, *bb24649* (BO, L); Muan Region near Sungei Riko, Balikpapan Bay, *Kostermans 4382* (BO, K, L, P, PNH, SING); Sangkulirang Island, E. Kutei, *Kostermans Nos. 4854* (BO, K, L, SING) and *4869* (BO, K, L, P, PNH, L, SING) and *4869* (BO, K, L, P, PNH, *termans 9536* (BO, K, L).
BRITISH NORTH BORNEO:	Cpt. 15, Sepilok F.R., *Wood & Kadir b. Abdul SAN 17049* (KEP, L, SAN, SING).
DISTRIBUTION:	Borneo.

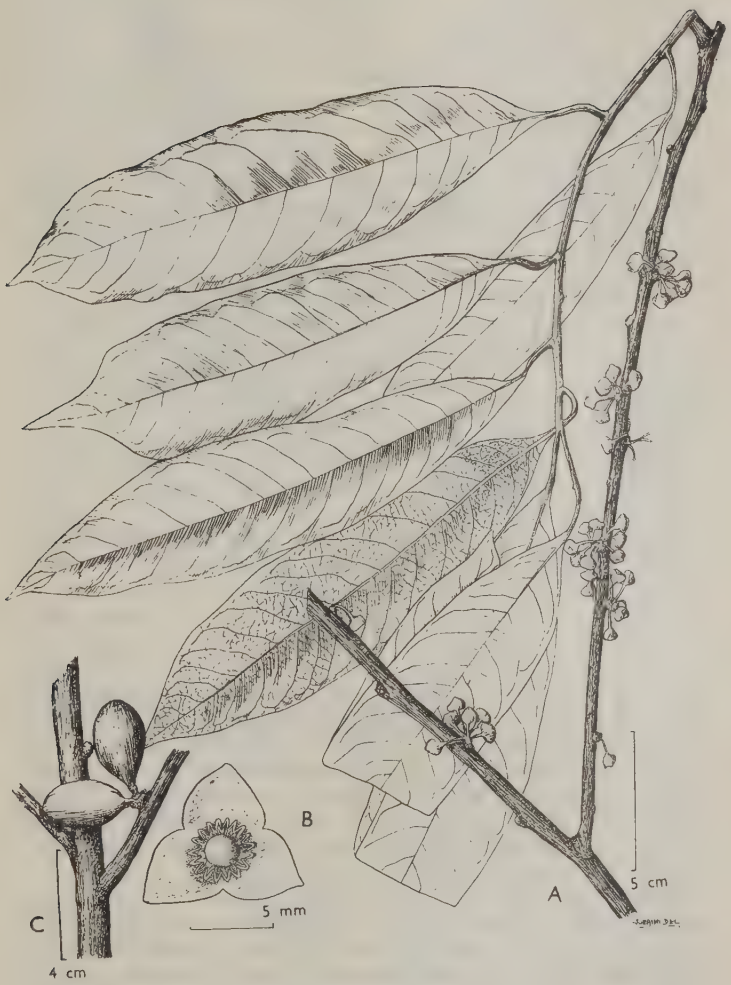


Fig. 18. ***Knema membranifolia*** Hubert Winkler.
A, twig with leaves and male flowers. B, male flower enlarged showing staminal column. C, fruit. A–B from *Winkler* type material. C from *Daud & Tachun S.F.N. 36113* (SING).

TYPE MATERIAL: *Hubert Winkler Nos. 2460* (BM, BO, BRSL, G, K, L, P, PNH, SING) and *2546* (BM, BO, BRSL, G, K, L, SING) both syntypes.

This species resembles typical *K. curtisii* from which it differs in the stouter, thicker twigs with the bark tending to crack slightly, the longer non-elliptic leaves with longer, 1.5 –2.5 cm. long petioles and more distinct reticulations, the larger, almost glabrous flowers, the circular staminal disc with well-spaced anthers and in the obovoid sessile or almost sessile fruit, the stalk when present being much shorter and thicker. The leaves of both dry a pale green, but those of *membranifolia* are of a more yellowish tinge.

(25) **Knema muscosa** J. Sinclair, **sp. nov.—Fig. 19.**

Propter flores parvos, pedicellos floriferos breves, antheras paucas (6–8), stipitatas, hanc speciem in "grege 7a" ponui. Haec species *K. tomentellae* proxima floribus tomentosis. Inter congeneres huius gregis, *K. muscosa* differt a *K. stenophylla* reticulationibus foliorum distinctis; a *K. communi* et a *K. tomentella* foliis juvenilibus glabris (subtus non squamosis nec stellato-tomentellis) et ab omnibus congeneribus (*K. stenophylla* excepta) foliis minoribus.

Arbor 8 m. alta. *Ramuli* graciles griseo-nigri glabri, apice ferrugineo-furfuracei. *Folia* coriacea, glabra, lanceolata, supra modice brunnea, subtus glauca, basi acuta, apice acuminata; 7–15 cm. longa; 2–3.5 cm. lata; costa utrinque valde prominens; nervi 10–12-jugati utrinque prominuli, graciles, marginem versus sensim curvati; reticulationes densissimae conspicuae; petioli 1 cm. longi setis minutis erectis nigris parce praediti *Flores masculi* in alabastro obovoidei 4 mm. longi et 3 mm. lati cum pilis partim stellatis, partim dendroideis ferrugineis; pedicelli 2–3 mm. longi, medio bracteolati; discus staminalis planus cum stipite 0.5 mm. longo; antherae 6–8, obtusae, stipitatae, leviter erectae. *Fructus* obovoideus, ferrugineo-tomentellus, apice mucronatus, 1.8 cm. longus, 1 cm. latus; stipes 7 mm. longus. *Semen* pallido-brunneum, 1.5 cm. longum, 8 mm. latum.

Tree 8 m. high. *Bark* characters unknown. *Twigs* slender, greyish-black, glabrous except the rusty-furfuraceous tips. *Leaves* coriaceous, drying medium brown above, glabrous beneath, lanceolate, base acute, apex acuminate; midrib prominent on both surfaces; nerves 10–12 pairs, fine, but rather faint on both surfaces, curving gradually towards the margins, the line of interarching indistinct; reticulations very close, conspicuous above and below; length 7–15 cm.; breadth 2–3.5 cm.; petiole 1 cm. long, sparsely covered with minute, black, erect, simple and branched hairs.

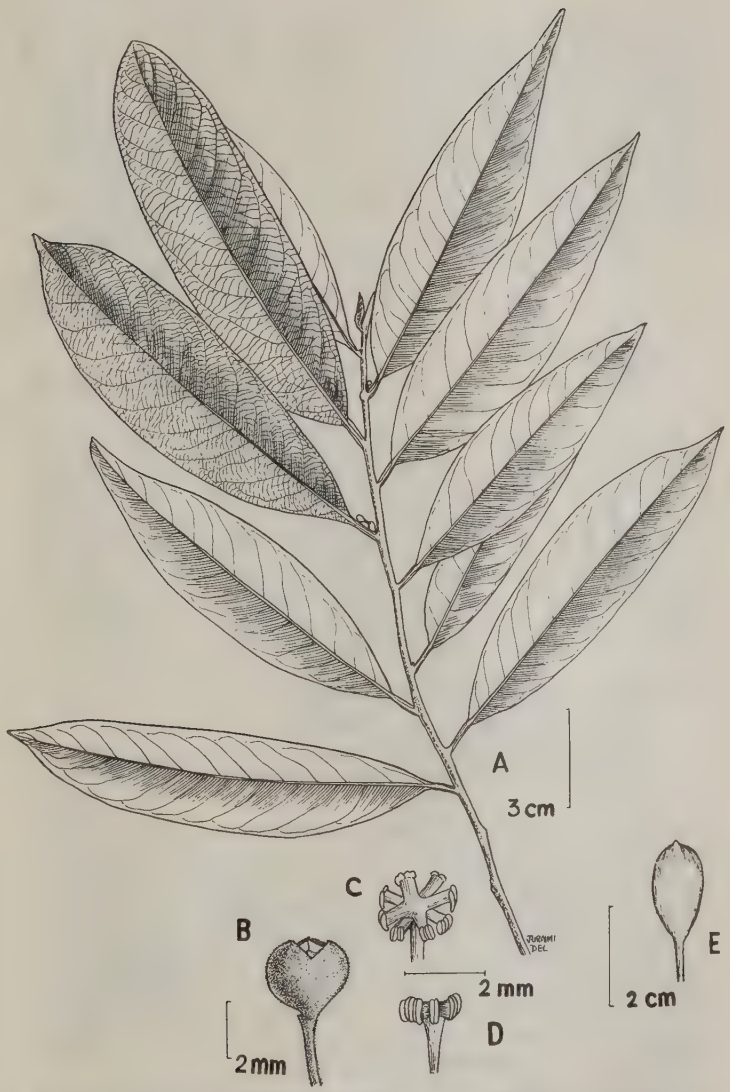


Fig. 19. *Knema muscosa* J. Sinclair.
A, twig with leaves and male flowers. B, male flower enlarged. C–D, staminal column. E, fruit. A–D from *Clemens 22120* (A isotype). E from *Clemens 21599* (NY).

Male flowers (not yet expanded) in bud ovoid, 4 mm. long and 3 mm. broad, rusty-tomentose outside, with both stellate and dendroid hairs, glabrous and striate inside, with a thickened tooth-like projection at the apex of each lobe; pedicels 2–3 mm. long with a minute bracteole at the middle; staminal disc flat on a 0.5 mm. long stalk; anthers 6–8, obtuse, shortly stalked, slightly erect. *Female flowers* not seen. *Fruit* obovoid, rusty-tomentulose, mucronate at the apex, 1.8 cm. long and 1 cm. broad on a 7 mm. long stalk. *Seed* pale brown, 1.5 cm. long and 8 mm. broad.

BORNEO SARAWAK:	Mt Majau, summit (probably Mt Sengajau), Gaat (Gat), Upper Rejang River, *Clemens Nos. 21599* (K, NY) and *22120* (A, BM, BO, K, L, NY, PNH, SAR, SING).
DISTRIBUTION:	As above.
TYPE MATERIAL:	*Clemens 22120* (A, BM, BO, K holotype, L, NY, PNH, SAR, SING).

This species, so far, is known only from the moss forest of Mt Majau. Its leaves are frequently covered with small epiphytic mosses and hepatics. For this reason I have named it "muscosa". I have placed it in group *7a*, where it is nearest to *K. tomentella* in the similar, small, tomentose flowers with few anthers. The flowers of the other near relatives are tomentulose, not densely tomentose. It differs from *K. tomentella* and *communis* in the glabrous leaves which are also smaller than in those of all the members of the group except *stenophylla.*

(26) **Knema oblongifolia** (King) Warb.

var. **oblongifolia** See Gard. Bull. Sing. 16 (1958) 321.

var. **monticola** (King) Warb. See Gard. Bull. Sing. 16 (1958) 323.

Note:—A specimen in the British Museum and in the University of California, *C. Boden Kloss s. n., Feb. 1912* (BM, UC) Menuang Gasing, Ulu Langat, Selangor, bearing the name *Myristica cantleyi* Hk. f. forma *glabrior* Ridley (a nomen nudum) was cited in a publication by Ridley in Journ. Fed. Mal. Stat. Mus. 6 (1915) 12 as *M. cantleyi* Hk. f., large-leaved, nearly glabrous form. This article was reprinted in J. Linn. Soc. Bot. 41 (1913) 296 but in none of these two publications is the actual name forma *glabrior* used. I have examined this sheet and found it to be **Knema oblongifolia** var. **monticola** (King) Warb.

(27) **Knema pectinata** Warb. Monog. Myrist. (1897) 556 t. 24.

Synonym: Myristica pectinata (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 90 *nom. alt.*—**Fig. 20.**

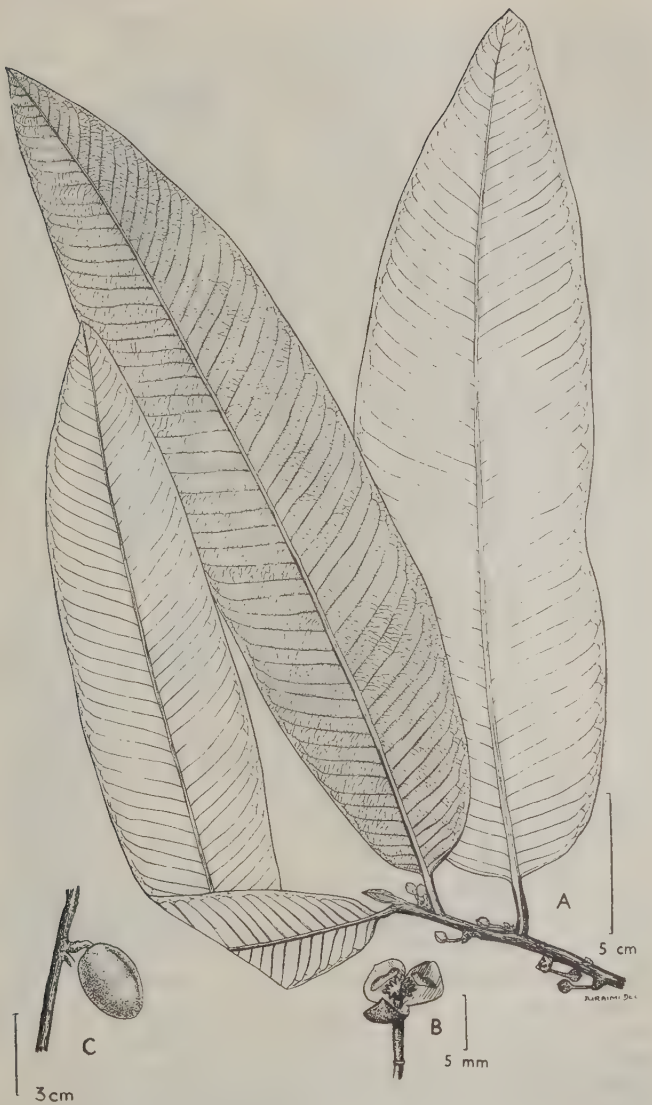


Fig. 20. *Knema pectinata* Warb.
A, twig with leaves and male flowers. B, male flower enlarged. C, fruit. A–B from *Beccari 1607* (FI holotype). C from *Wood SAN 16286* (SING).

Tree 15 m. high. *Bark* greyish brown or reddish brown, hard, a few thin large flakes and some dents here and there, where the flakes have fallen out, otherwise smooth; sap red, fairly copious. *Twigs* stout and rusty-puberulous at the apex, lower down glabrous, and striate. *Leaves* coriaceous, glabrous, lanceolate or oblong-lanceolate, dark green and glossy above with whitish midrib, drying dark brown above and glaucous beneath, apex acute or somewhat obtuse, base rounded or sub-cordate; midrib stout, raised on both surfaces; nerves very numerous, 40–52 pairs, parallel, nearly horizontal, interarching at the margins in a double loop, fine above but distinct, slightly depressed, very prominent beneath; reticulations forming a very close network on both surfaces, but less distinct above; length 20–32 cm.; breadth 6–9 cm.; petiole stout, 1.5–2 cm. long. *Male flowers* on short woody tubercles; pedicels 8 mm.—1 cm. long, slightly angled, minutely pubescent with a minute bracteole at the middle or slightly above the middle; perianth triquetrous in bud, 5–6 mm. in diam., minutely medium brown-tomentulose outside, whitish at the margins, pale red and glabrous inside; staminal disc sub-concave, 1.75 mm. in diam., bearing about 14 sub-sessile anthers. *Fruit* oblong, medium brown-tomentulose, flanged along the line of suture, 3 cm. long and 1.8 cm. broad (not mature); stalk 2 mm. long.

BORNEO SARAWAK:	**1st Division**:—Kuching, *Beccari 1607* (FI, G, K, M, P, S); north slopes of Mt Penrissen, *M. Jacobs 5112* (L, SAR); Matang, *Sinclair 10340* (A, B, E, K, L, SAR, SING) alt. 1,500-2,000 ft.
BRITISH NORTH BORNEO:	Ulu Moyah, Sipitang, 8 mls. S.S.E. of Malaman, *Wood SAN 16286* (KEP, L, SAN, SING).
DISTRIBUTION:	As above.
TYPE MATERIAL:	*Beccari 1607* (FI holotype, G, K, M, P, S).

more numerous nerves.

This rare species is remarkable for its numerous, thick, parallel nerves and coriaceous leaves. It may be placed in the group with *korthalsii, glomerata* and *woodii* from which it differs in the

(28) **Knema percoriacea** J. Sinclair, **sp. nov.—Fig. 21.**

Haec species inter *K. furfuraceam* et *latericiam* ponenda sed secundae proxima accedit. A priore foliis aliquantum minoribus, basi rotundatis vel acutis (non cordatis) florum et fructuum tomento densiore et longiore, pedicellis floriferis brevioribus et a *latericia* ramulis crassioribus, foliis magis coriaceis, floribus majoribus cum pedicellis crassioribus, tomentum eorum longioribus, antheris pluribus differt.

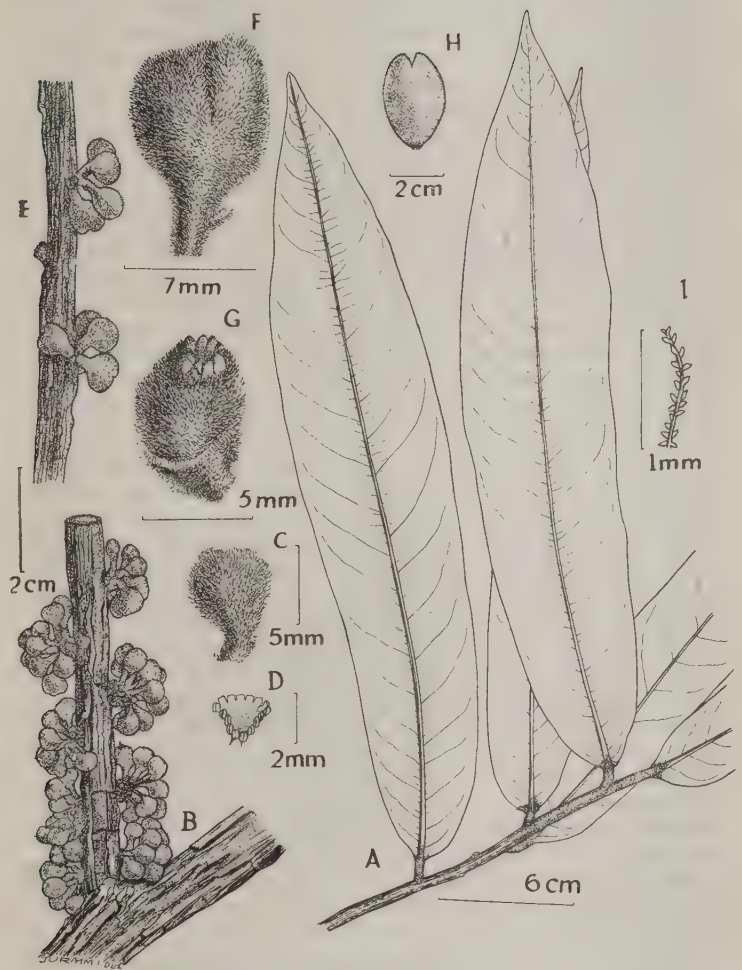


Fig. 21. *Knema percoriacea* J. Sinclair.

A, twig with leaves. B, male flowers. C, male flower enlarged. D, staminal column. E, female flowers. F, female flower enlarged. G, ovary with stigmas. H, fruit. I, hair from C enlarged. A from *Kostermans 9945* (L.) B–D from *Ashton BRUN 5164* (SING). E–G from *Kostermans 4164* (L). H from *Winkler 2110* (L).

Arbor 5–22 m. alta. *Cortex* fuscus, longitudinaliter striatus, non abscidens; latex ruber. *Ramuli* apice ferrugineo-tomentosi, in partibus vetustioribus decorticantes brunnei vel griseo-brunnei. *Folia* coriacea, supra atro-viridia nitida (in sicco olivacea) lanceolata, apice acuta vel rotundata, 13–32 cm. longa, 3–7 cm. lata; petioli 1–1.5 cm. longi; costa supra albida, subtus flavido-viridis, utrinque elevata; nervi 18-22-jugati distinctae; reticulationes prominentes, subtus plerumque scalariformes. *Flores masculi* globosi fasciculati, per fasciculum 10–12 dispositi, ferrugineo-tomentosi, 5–6 mm. in diam. (nondum aperti) cum pilis dendroideis 1–2 mm. longis; perianthii lobi intus infra apicem incrassati; pedicelli crassi, 3 mm. longi, medio bracteolati; discus staminalis triangularis, antheris 14–17 obtusis sessilibus coronatus. *Flores feminei* ut in masculis sed multo majores, 8–9 mm. longi, 7 mm. lati; pedicelli 4 mm. longi et crassi; ovarium sub-globosum, dense tomentosum, 5 mm. in diam.; stigma in ± 10 lobos fissum. *Fructus* sessilis, oblongo-ellipsoideus, dense ferrugineo-tomentosus, 3 cm. longus, 2 cm. latus.

Tree 5–22 m. high. *Bark* dark reddish brown, longitudinally striate but not flaking; sap red. *Twigs* rusty-tomentose at the apex, greyish brown with flaking bark in the older portions. *Leaves* coriaceous, dark green and glossy above with whitish midrib, olivaceous when dry, glaucous beneath with yellowish green midrib, lanceolate, apex acute, base acute or rounded; midrib raised above and below; nerves 18–22 pairs, distinct on both surfaces; reticulations also distinct on both surfaces, mostly scalariform beneath; length 13–32 cm.; breadth 3–7 cm.; petiole stout, 1–1.5 cm. long. *Male flowers* compact, in clusters of 10–12, rusty-tomentose with 1–2 mm. long dendroid hairs, sub-globose in bud, 5–6 mm. in diam. (not quite mature); perianth lobes coriaceous, thickened inside below the apex; pedicels stout, 3 mm. long with a median bracteole; staminal column triangular with 14–17 obtuse, sessile anthers. *Female flowers* as in the male but much larger, 8–9 mm. long and 7 mm. broad; pedicels 4 mm. long and 4 mm. thick; ovary sub-globose, densely tomentose, 5 mm. in diam.; stigma lobes about 10. *Fruit* sessile, densely rusty-tomentose with dendroid hairs, oblong-ellipsoid, 3 cm. long and 2 cm. broad.

BORNEO SARAWAK: Gunong Gaharu, *Sinclair 10244* (A, B, E, K, L, SAR, SING); Kapit, Upper Rejang River, *Clemens 21209* (K, NY, SAR).

BRUNEI: Berakas, *Ashton 5164* (BRUN, L, SAR, SING); Kuala Belalong, Temburong, *Ashton, Smythies & Wood SAN 17080* (BRUN, K, L, SING).

WEST BORNEO: Simpang, Djerungkong, *bb8319* (BO).

South-East Borneo: South and	Hayup, *Hubert Winkler 2110* (BO, BRSL, K, L).
East and North-East Borneo:	Loa Djanan, west of Samarinda, *Kostermans Nos. 6731* (BO, K, L); *9880* (BO, K, L) and *9945* (BO, K, L, SING); Sungei Wain, north of Balikpapan, *bb Nos. 34455* (BO, L); *34467* (BO, L); and *34469* (BO, K, L); *Kostermans Nos. 4060* (BO, K, L, PNH, SING); *4164* (BM, BO, K, L, P, PNH, SING) and *4535* (BO, K, L, P, PNH, SING); Mentawir River basin, *Sauveur Nos. 17* (BO, K, L, P, SING) and *122* (BO, K, L).
British North Borneo:	Ulu Mendalong, 6 miles S.S.E. of Malaman, Sipitang, *Wood SAN 16749* (K, L, SAN, SING).
Pulau Nunukan:	*bb26185* (BO, L).
DISTRIBUTION:	Borneo.
TYPE MATERIAL:	*Kostermans 9945* (BO, K holotype, L, SING).

This species is somewhat intermediate between *K. furfuracea* and *latericia* and one may have some difficulty in distinguishing it from either when sterile. It differs from typical *latericia* in the rigidly coriaceous leaves and in the thicker twigs, the latter 4–6 mm. thick at the apex as against 2–3 mm. in *latericia*. In this respect its twigs are like those of *furfuracea*, while the leaves, also somewhat similar, are slightly smaller than those of that species and are not cordate at the base. The flowers, male and female, are larger than those of *latericia* (about 4 times) and the similar dendroid hairs of their tomentum are longer, 1–2 mm. long as against 0.25–0.5 mm. in *latericia*. The tomentum of the flowers and fruits is also longer than that of *furfuracea* and does not tend to get rubbed off as in that species. The flowering pedicels are thicker and shorter than those of both *latericia* and *furfuracea*. The anthers too, (a good criterion for separation) are more numerous, 14–17, as against 9–12 and 10–13 in *latericia* and *furfuracea* respectively.

I had intended to make *percoriacea* a variety of *latericia* but I saw a tree of the former in Sarawak and the bark of the main trunk was entirely different—longitudinally striate and not flaking as in *latericia*. The bark of the twigs, however, is flaky like that of *latericia*. The different bark of the main trunk and the rather numerous other differences justify, in my opinion, the raising of its rank to that of a species.

(29) **Knema plumulosa** J. Sinclair. See Gard. Bull. Sing. 16 (1958) 312.

(30) **Knema retusa** (King) Warb. Monog. Myrist. (1897) 612 t. 25; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 249; Ridley, Fl. Mal. Pen. 3 (1924) 72; Sinclair in Gard. Bull. Sing. 16 (1958) 318.

Basionym: Myristica retusa King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 330 pl. 171.—**Fig. 22.**

In October 1958 I visited Gunong Bubu, Perak, the object in view being to try to get flowering material of *K. retusa* which was collected once and in fruit only by King's collector from this single locus classicus—*King 7690* (BO, CAL, G, K, L, P). Although the area is about 20 miles long and 5 miles wide, and at that time there were bandits there, I succeeded in finding several trees and obtained male and female flowers and young fruit. The tree is conspicuous in the forest by its large leaves with a rusty undersurface. Since King's description is incomplete, I now give some additional notes.

Tree 6–18 m. high. *Bark* dark brown, very slightly rough, but not flaking nor furrowed; sap pink, copious. *Leaves* dark green, glossy and with a whitish-green midrib above, covered with minute rusty scales beneath, greyish or glaucous later. *Male flowers* coriaceous, 1–1.2 cm. long, 7 mm. broad, medium brown, tomentulose outside, whitish inside, slightly fragrant; pedicels 1–1.5 cm. long with a 2–3 mm. long bracteole at the base of the perianth; staminal disc concave or flat with 15 white, sub-erect, shortly stalked anthers. *Female flowers* oblong, 1.4 cm. long and 1 cm. broad, the perianth split down $\frac{3}{4}$ of its length into the lobes; pedicels 3–5 mm. long; ovary chocolate-tomentose, 5 mm. long and 6 mm. broad, tapering into the 2-lobed stigma, each lobe again divided into 2 smaller lobes. *Fruit* stalk 1 cm. long.

PERAK (extra specimens): Gunong Bubu F.R., Sungei Kenas, *Sinclair 9885* (B, P, SING) sterile; Gunong Bubu F.R., Manong, *Sinclair Nos. 9907* (A, B, E, K, L, SING) male and *9908* (A, E, K, L, NY, SING) female.

The aril is normal (observed from young fruit) and not merely embracing the base of the seed as stated by King. The alliance is not with *K. mandaharan* with which I put it in the absence of flowering material. It would appear to be placed best in group 3b next to *K. ashtonii* and near to *oblongifolia* (group 3a), but differing from the latter in having stalked anthers. Both have large obtuse leaves with many nerves and an apiculate fruit. The rusty brown appearance of the lower surface of the large leaves will distinguish it from other Malayan species.

Fig. 22. *Knema retusa* (King) Warb.

A, twig with leaves. B, ovary and stigmas. C, fruit. D, twig with male flowers. E, male flowers. F–G, staminal column. H, scale from lower surface of leaf. I, twig with female flowers. A, B and I from *Sinclair 9908* (SING). C from *King 7690* (L isotype). D–H from *Sinclair 9907* (SING).

(31) **Knema rigidifolia** J. Sinclair. See Gard. Bull. Sing. 16 (1958) 284.

(32) **Knema rufa** Warb. Monog. Myrist. (1897) 556 t. 24 f. 1–3.

Synonym: Myristica rufa (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 90 *nom. alt.*—**Fig. 23.**

Tree 3–15 m. high. *Bark* dark brown, not furrowed nor flaking, sparsely covered with lenticels. Young *twigs* slender, 2–3 mm. thick at the apex, rusty-tomentose, later glabrous, medium brown, greyish lower down, faintly striate. *Leaves* thinly coriaceous, glabrous except when very young, dark green and dull above with a whitish green midrib, glaucous beneath with a yellowish green midrib, lanceolate, base rounded and then cuneate, apex acuminate; midrib raised on both surfaces; nerves 14–20 pairs, equally prominent on both surfaces as are the close reticulations, spreading, almost horizontal, rather crooked, interarching near the margins; length 15–25 cm.; breadth 3–4.5 cm.; petiole 1–1.5 cm. long, rusty-tomentose when young, later glabrous. *Male flowers* on very short, 2 mm. long, axillary tubercles; pedicels 1.5–2 cm. long, rusty-tomentose with a minute bracteole a little below the flower; perianth 6 mm. long and 5 mm. broad, rusty-tomentose outside with dendroid hairs, glabrous inside, ovoid-globose in bud, 3-lobed, the lobes broad and obtuse; staminal disc sub-concave with 10–15 elongate, sub-sessile anthers, the connectives produced slightly beyond the anthers. *Female flowers* not seen. *Fruit* elliptic, 2.3–2.5 cm. long and 1.5 cm. broad, sparsely covered with 3 mm. long, shining, rusty-brown hairs; stalk 2 cm. long.

BORNEO SARAWAK:	**First Division**:—Mount Matang, *Beccari 1798* (FI, G, K, P); Semengoh F.R., *Sinclair 10191* (E, K, L, SAR, SING) fruit; Sungei Sabal Tapang, Serian, *Sinclair 10267* (E, SAR, SING) fruit.
BRUNEI:	Andulau F.R. (west) area of construction of a new road, *Sinclair 10451* (A, B, E, FI, K, L, NY, SAR, SING) immature male flowers.
DISTRIBUTION:	Sarawak and Brunei. Rare.
TYPE MATERIAL:	*Beccari 1798* (FI holotype, G, K, P).

I went specially to Borneo to look for this rare species, collected once in male flower by Beccari. I was fortunate to find it at Semengoh Forest Reserve on the first day of my expedition and with fruit. The leaves are exactly like those of *K. intermedia.* The flowering pedicels are longer, the flower is larger, and the staminal disc is flat or concave, not mammillate. The shaggy fruit is quite unlike that of any other *Knema* species and will at once distinguish it.

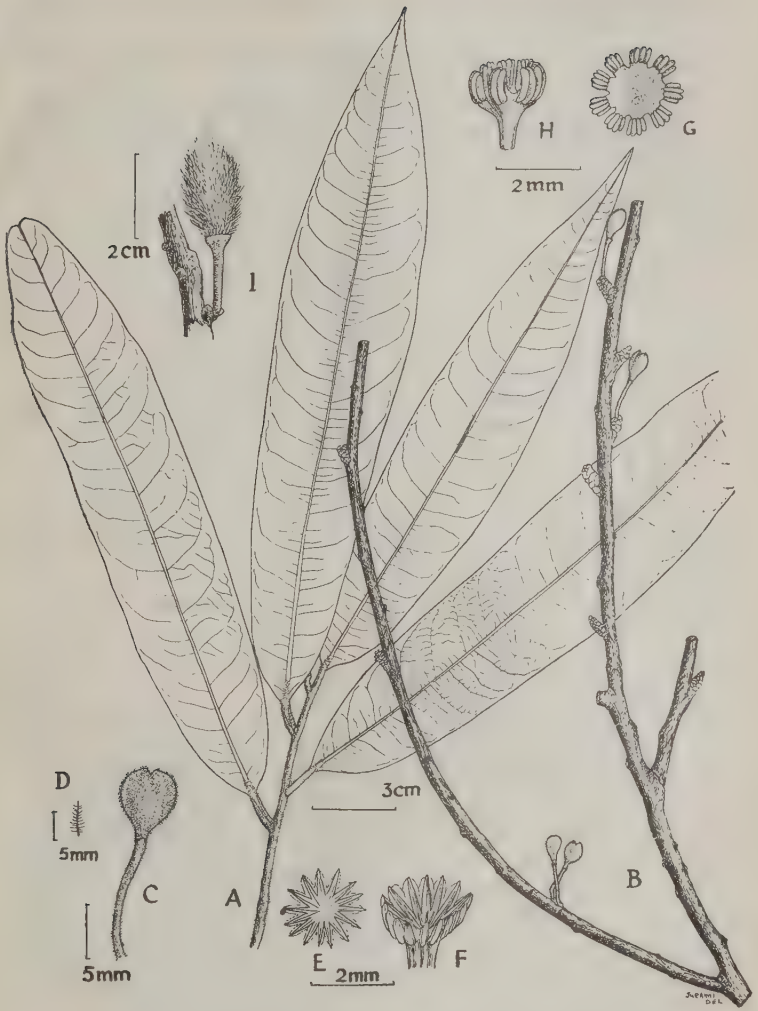


Fig. 23. *Knema rufa* Warb.

A, twig with leaves. B, twig with male flowers. C, male flower enlarged. D, hair enlarged from male flower. E–F, staminal column with dehiscing anthers. G–H, staminal column with young anthers. I, fruit. A–F from *Beccari 1798* (FI holotype). G–H from *Sinclair 10451* (SING). I from *Sinclair 10191* (SING).

(33) **Knema scortechinii** (King) J. Sinclair in Gard. Bull. Sing. 16 (1958) 288 f. 7.

Basionym: Myristica scortechinii King in Ann. Roy. Bot. Gard. Calc. 3 (1891) 317 pl. 153.

Synonyms: Knema conferta var. *scortechinii* (King) Warb. Monog. Myrist. (1897) 580; Gamble, Mat. Fl. Mal. Pen. 5, 23 (1912) 244; Ridley, Fl. Mal. Pen. 3 (1924) 70.

SUMATRA EAST COAST:	Labuhan Batu, Perbaungan, *bb10335* (BO).
MALAY PENINSULA:	Kedah, Perak, Trengganu, Pahang, Selangor, Johore. For list see Gard. Bull. Sing. 16 (1958) 289. Additional records:—NEGRI SEMBILAN: Sungei Menyala F.R., *Wyatt-Smith K.F.N. 64726* (KEP) and *G. H. S. Wood K.F.N. 71870* (KEP); Nilai, Jindaram Estate, *Md. Shah 81* (SING) and *126* (SING).
DISTRIBUTION:	Sumatra and Malay Peninsula.
TYPE MATERIAL:	*M. scortechinii* King, Scortechini, Wray and King's numbers. See Gard. Bull. Sing. 16 (1958) 289.

Since my account of the Malay Peninsula Myristicaceae appeared in 1958, this species is now recorded for the first time from Sumatra and there are several records for Negri Sembilan. *M. laurina* var. *borneensis* Miq. is not a synonym for this species as stated by King and myself but is simply *K. laurina.*

(34) **Knema stenophylla** (Warb.) J. Sinclair in Gard. Bull. Sing. 16 (1958) 300 f. 11.

Basionym: Gymnacranthera stenophylla Warb. Monog. Myrist. (1897) 364 t. 20 f. 1–2.

Synonym: Myristica stenophylla (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 88 *nom. alt.*

MALAY PENINSULA:	Kedah, Kelantan, Penang, Perak, Trengganu, Pahang, Selangor, Negri Sembilan and Johore. For list see Gard. Bull. Sing. 16 (1958) 300. New and first records for Negri Sembilan:—Nilai, Jindaram Estate, *Mohd. Shah Nos. 72* (A, BKF, BO, DD, K, L, LAE, LWG, PNH, SING) and *88* (A, BKF, BO, DD, K, L, LAE, PNH, SING). There are also records for Pulau Jarak in the Straits of Malacca, *Wyatt-Smith K.F.N. 71059* (KEP) and Pulau Lalang, *Wyatt-Smith 101* (KEP).
DISTRIBUTION:	Malay Peninsula.
TYPE MATERIAL:	*Kehding 150* (FI holotype).

Lowland forest. Near to *K. cinerea* vars *sumatrana* and *patentinervia* and to *K. malayana* but with smaller leaves and fainter nerves. The flowers too, are smaller.

(35) **Knema tomentella** (Miq.) Warb. Monog. Myrist. (1897) 588 t. 25 f. 1–2.

Basionym: Myristica corticosa (Lour.) Hk. f. et Th. var. *tomentella* Miq. in Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 207.

Synonyms: M. corticosa var. *amplifolia* Miq. in Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 207. *M. corticosa* var. *ceramensis* Miq. in Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 51. *M. glauca* Bl. var. *bancana* (Warb.) Boerl. Handl. Fl. Ned. Ind. 3, 1 (1900) 92 *nom. alt. M. laurina* var. *minahassae* (Warb.) Boerl. l. c. 92 *nom. alt. M. tomentella* (Miq.) Boerlage, Handl. Fl. Ned. Ind. 3 (1900) 91 *nom. alt. K. glauca* (Bl.) Warb. var. *bancana* Warb. Monog. Myrist. (1897) 597—**syn. nov.** *K. laurina* (Bl.) Warb. var. *minahassae* Warb. Monog. Myrist. (1897) 620—**syn. nov.** *Knema stellata* Merr. in Philip. J. Sc. Bot. 11 (1916) 182 et in Enum. Philip. Fl. Plants 2 (1923) 184—**syn. nov.** *K. alvarezii* Merr. in Philip. J. Sc. Bot. 13 (1918) 288 et Enum. Philip. Fl. Plants 2 (1923) 183—**syn. nov.** *Palala sexta* Rumph. Herb. Amb. 2 (1750) 28.—**Fig. 24.**

Tree 5–12 m. high. *Bark* brownish grey with some dents but no flakes or fissures; inner bark red; sap red, copious. *Twigs* striate and rusty-tomentulose at the apex with dendroid and stellate hairs, glabrous and greyish brown lower down. *Leaves* coriaceous, glabrous above, rusty-furfuraceous on the lower midrib, becoming glabrous, dark green and glossy above when fresh, dark brown or slightly greenish brown above when dry, glaucous beneath, rather variable in shape, lanceolate, oblong-lanceolate, elliptic-lanceolate or slightly obovate, apex acute, sharply acuminate or less often obtuse or retuse, base acute to rounded; midrib raised on both surfaces; nerves 12–26 pairs, distinct and raised on both surfaces; reticulations forming a dense network on both surfaces; length 7–25 cm.; breadth 2–7 cm.; petiole 1 cm. long. *Male flowers* densely rusty-tomentose with dendroid and stellate hairs, 2.5–3 mm. long, deeply tri-lobed; pedicels very short, about 3 mm. long with a minute ± median bracteole; staminal disc flat with 6–9 stalked, well-spaced, obtuse anthers. *Female flowers* as in the male but 5–6 mm. long; pedicels thick, 3 mm. long; ovary tomentose, 1.5 mm. in diam. with a sessile, bi-lobed stigma, the main lobes again 2–3–lobed. *Fruit* harshly rusty-tomentose with stellate and dendroid hairs, obovoid, less often sub-globose, obtuse at the apex, narrowed towards the base, 2–2.5 cm. long and 1.8 cm. in diam.; stalk 5 mm.—1 cm. long and 3 mm. thick.

Fig. 24. *Knema tomentella* (Miq.) Warb.
A, twig with leaves and male flowers. B, male flower enlarged. C–D, staminal column. E–F, female flowers enlarged. G, fruit. H, narrower leaves of the Philippine *K. stellata*, now included in *K. tomentella*. I, fruit from the above Philippine form. A–D from *Robinson 238* (A). E–F from *Robinson 236* (SING). G from *Kostermans 646* (PNH). H–I from *Merrill 1706* (PNH).

PHILIPPINES LUZON: **Prov. Nueva Ecija:**—Mt Macasandal, *Alvarez Nos. 22395* (BM, BO, L, P) and *22397* (BM, K, US).

Prov. Rizal:—Montalban, *Loher Nos. 12390* (A, BM, BO, M, P, UC); *13390* (A, M, UC); *12630* (UC).

Prov. Laguna:—Makahuyong, Mt Banahao, *E. Gutierrez 3487* (SING).

SAMAR: Ambalate, *Ramos 1706* (A, BM, BO, BRI, CAL, G, L, NSW, NY, P, PNH, SING); Catubig River, *Ramos Nos. 24276* (A, BM, K, NY, P, US) and *24430* (K, P, US); Cagmanaba, Catubig River, *Sablaya 52* (A, K, P).

CELEBES NORTH PENINSULA: Minahassa, *Koorders Nos. 18132* (BO) and *18152* (BO, L); the remainder Manado, *Koorders Nos. 18167* (BO) and *18169* (BO); Rarampondo, *bb15087* (BO, L); Amurang, *bb17178* (A, BO, L); *Beccari 7772* (FI) cult. Hort. Bog. ex Manado, (*Riedel*).

CENTRAL CELEBES: Usu, Malili, *Cel III/112* (BO, L) and *Cel II/318* (BO, K, L); Ra Roua, *bb2329* (BO); Malili, *Kjellberg 2006* (BO, S); Preho, *Kjellberg 2494* (BO, S).

SOUTH-WEST PENINSULA: Rante Lemo, *Kjellberg 1608* (S); Todjambu, *Kjellberg 1807* (BO, S); Pangkadjene, *Teijsmann 11735* (BO, L, SING); Bikeru, *Warburg Nos. 16718* (E) and *16719* (C, L, LE, M).

SOUTH-EAST PENINSULA: Wawo-Sondu near Kendari, *Beccari Nos. 7770* (FI) and *7771* (FI); Kendari, *Kjellberg 621* (BO, S); Staringbaai, *Pella 60* (BO).

MOLUCCAS MOROTAI: Totodaku, *Kostermans 646* (A, BO, K, L, PNH, SING).

HALMAHEIRA: Tilope, West Peninsula, *Anang 542* (BO, L).

BATJAN: Kampong Senggah, N. of Labuha, *Alston 16910* (BM).

OBI: *Atasrip Nos. 62* (BO, SING) and *89* (BO, SING); B. Kasina, *bb23801* (BO, L).

BURU: Kajeli, *Teijsmann s.n.* (BO, SING); Ehu, *Toxopeus 867* (BO).

CERAM: *Teijsmann s.n.* (K); *Teijsmann Nos. 1991* (BO, U) and *5019* (BO, CAL, U); *Teijsmann & de Vriese s.n.* (L); *de Vriese* s.n. (CAL, L); Piru, West Ceram, *Rutten 2103* (BO, L, U).

AMBON: Hatui Besar, *bb10130* (BO); *Robinson Nos. 236* (A, BM, BO, CAL, K, L, NY, P, NSW, SING, US); *237* (A, BO, K, L, US) and *238* (A, BM, P, NY, US); *de Fretes 5745* (BO, PDA); *de Fretes s.n.* (U); *Teijsmann s.n.* (BO, SING).

NEW GUINEA VOGELKOP (DUTCH WEST NEW GUINEA): Warnapi, north of Ransiki, 80 km south of Manokwari, *Kostermans 4745* (A, BO, K, L, PNH, SING).

CULTIVATED: Hort Bog. IVH *87 Sinclair 10029* (A, B, E, K, L, NY, SING) origin Ambon; Hort. Bog., *Warburg 1742* (L, LE, M); Hort. Bog. *Beccari Nos. 7789* (FI); *7789a* (FI) and *s.n.* (FI).

DISTRIBUTION: Philippines, Celebes, Moluccas and New Guinea.

TYPE MATERIAL: *M. corticosa* var. *tomentella* Miq., Ambon, (Teijsmann) *de Fretes* (U holotype); var. *amplifolia* Miq., Manado, (*Riedel*) *Beccari 7772* (FI holotype); var. *ceramensis* Miq., Ceram, *Teijsmann & de Vriese* (CAL, K, L, U); *Teijsmann 1991* (BO, U) and *5019* (BO, CAL, U). *K. glauca* (Bl.) Warb. var. *bancana* Warb., Cult. Hort. Bog. *Beccari s.n.* (FI holotype); *Beccari 7789* (FI) and *Beccari 7789a* (FI); the numbered sheets also part of the type collection but *Beccari s.n.* quoted by Warb. is the holotype. The FI sheets were given numbers later. *K. laurina* var. *minahassae* Warb., *Koorders Nos. 18167* (BO) and *18169* (BO). *K. stellata* Merr., *Ramos 24276* (A, BM, K, NY, P, US). *K. alvarezii* Merr., *Alvarez Nos. 22395* (BM, BO, L, P) and *22397* (BM, K, US).

VERNACULAR NAMES: *Rahaan* (north Celebes); *kasumbeli* (S.E. Peninsula, Celebes); *palala puteh* or *palala daun-kechil* (Ambon).

This is the only *Knema* species in New Guinea. The small, tomentose flowers and the very short pedicels are noteworthy. The striate twigs, the closely reticulate leaves, the deeply lobed perianth, the median bracteole and the stalked anthers are characters which suggest an alliance with *K. conferta* and *scortechinii* but it is distinct in the few anthers and the very short flowering pedicels. It is perhaps nearest to *K. muscosa*. I have placed it in group 7a along with *muscosa*. See under that species. The leaves are variable in size and they are usually acuminate at the apex. Sometimes they are retuse giving the

plant quite a different appearance. I cannot describe the specimens with retuse leaves as a separate form or variety since I have seen sheets with acuminate, obtuse and retuse leaves on the same specimens. *K. glauca* (Bl.) Warb. var. *bancana* Warb. belongs here and not to (*glauca*)=*cinerea*. It was described from material grown in Hort. Bogoriensis but the origin cannot be Banka as stated by Beccari on the label. [Similarly *K. laurina* var. *amboinensis* Warb. was described from material collected in Hort. Bog. by Beccari, reputed to have come from Ambon. Again the locality cannot be Ambon as this species (*laurina*) is not found in the Moluccas. This variety actually, is not different from typical *laurina* nor is *K. laurina* var. *bancana* Cult. in Hort. Bog. origin Banka different from typical *laurina*. It seems that the labels from Banka and Ambon have been mixed in Hort. Bogoriensis. This is not surprising or unusual as the trees of *Myristicaceae* in Bogor grow close together and from my own experience I have observed some erroneous localities on their labels. I saw and collected good material of typical *K. tomentella* in Bogor, origin Ambon, which is identical with Warburg's *K. glauca* var. *bancana*, namely *Sinclair 10029 IVH 87*.

(36) **Knema uliginosa** J. Sinclair, **sp. nov.—Fig. 25.**

Inter species cum androecio apice mammillato haec ponenda. *K. plumulosae* proxima sed ramulis glabris pallido-griseis et floribus minoribus praecipue differt.

Arbor 5 m. alta. *Ramuli* glabri, pallido-grisei, leves. *Folia* sub-coriacea, glabra, lanceolata, basi rotundata vel acuta, apice acuta vel acuminata, 14–29 cm. longa, 3.5–7 cm. lata; costa, et nervi (15–18—jugati) utrinque prominentes; reticulationes vix conspicuae; petioli 8 mm.—1 cm. longi. *Flores masculi* 5–6 mm. in diam., pilis dendroideis breviter ferrugineo-tomentosi, in alabastro apice depressi; pedicelli 5–6 mm. longi prope apicem minute bracteolati; androecium apice convexum vel mammillatum brevissime stipitatum, cum antheris 12 obtusis horizontalibus distantibus fere sessilibus vel breviter stipitatis stellatim coronatum. *Fructus* sub-globosus vel paullo obovatus, ferrugineo-tomentosus, 1.8 cm. longus, 1.5 cm. latus cum stigmate persistenti, 8–10-lobato et cum stipite 4 mm. longo.

Tree 5 m. high. *Twigs* glabrous, pale grey, smooth and non-striate, reddish-brown and slightly furfuraceous at the extreme apex. *Leaves* thinly coriaceous, glabrous, lanceolate, base rounded or acute, apex acute or acuminate; the midrib and the 15–18 pairs of nerves distinctly raised on both surfaces; length 14–29 cm.; breadth 3.5–7 cm.; petiole 8 mm.—1 cm. long. *Male flowers* 5–6 mm. in diam., shortly rusty-tomentose with dendroid hairs,

Fig. 25. *Knema uliginosa* J. Sinclair.

A, twig with leaves and male flowers. B, male flower enlarged. C–D, staminal column. E, young fruit with remains of stigmas. A–D from *Main 2098* (SING isotype). E from *Anderson SAR 447* (SING).

the flower buds depressed at the apices; pedicels 5–6 mm. long with a minute bracteole near the base of the flower; staminal disc convex or mammillate at the apex and on a very short, 0.5 mm. long stalk; anthers 12, obtuse, horizontal, shortly stalked or nearly sessile, well-spaced. *Fruit* sub-globose or slightly obovoid, rusty-tomentose with the remains of the stigma (8–10 lobes), 1.8 cm. long and 1.5 cm. broad; stalk short, 4 mm. long.

BORNEO SARAWAK:	Loba Kabang (South) Protected Forest, Sibu, *Anderson Nos. SAR 447* (KEP, SAR, SING) and *SAR 9893* (SAR, SING); Lubok Antu, 2nd Division, *Brooke 10696* (BM, L).
WEST BORNEO:	Suka Lanting, *Hallier 85* (BO); Sungei Kenepai, *Hallier Nos. 2102* (BO, L, SING, U) and *2207* (BO, SING); Pulau Nibung, Silimban, Kapuas, *Main 2098* (A, BO, K, L, SING); Kapuas, *Teijsmann 8679* (BO, SING).
SOUTH AND SOUTH-EAST BORNEO:	Sampit, *Buwalda Nos. 7658* (A, BO, K, L); *7741* (BO); *7743* (BO); *7768* (BO) *7769* (BO).
DISTRIBUTION:	Borneo (Sarawak, West Borneo and South Borneo).
TYPE MATERIAL:	*Main 2098* (A, K holotype, L, SING).

A tree of the fresh water and peat swamp forest. The glabrous, greyish twigs without striations and the structure of the flowers with the mammillate disc and several lobed stigmas are the outstanding features. The other two species in this group with a mammillate disc are *K. intermedia* and *K. plumulosa, K. uliginosa* lacks the reticulations of the leaves so well seen in these two species but agrees in having the veins raised on both surfaces. In this respect its leaves recall those of *K. latericia* which also has raised veins but those of *K. uliginosa* are never so oblique and curve gradually from the midrib to the margins. The fruit is tomentose while that of *K. intermedia* has some stellate scurf which rubs off easily.

(37) **Knema woodii** J. Sinclair, **sp. nov.—Fig. 26.**

In aspectu generali ramulorum, foliorum, florum, haec species *K. glomeratae* et *K. korthalsii* similis. A priore (cui proxima) nervis et antheris pluribus, floribus majoribus, pedicellis masculis longioribus; ab altera nervis paucioribus, floribus tomentellis (non tomentosis) paulo majoribus, antheris pluribus; et ab ambabus speciebus ramulis glabris, prope apicem angulatis, infra apicem saepe nigritis, disco stamineo triangulari differt.

Fig. 26..*Knema woodii* J. Sinclair.

A, twig with male flowers. B, apical portion of twig with leaves and male flowers. C, male flower enlarged. D–E, staminal column. F, ovary and stigmas. A–E from *Sinclair 9298* (SING holotype). F from *M. Jacobs 5235* (SAR).

Arbor 18–28 m. alta. *Cortex* atro-griseus, assulas tenues abscidens; latex copiosus. *Ramuli* glabri, apice angulati, nigriti, infra teretes grisei. *Folia* coriacea, glabra, oblonga, marginibus fere parallelis, supra atro-viridia, nitida, subtus glauca, apice acuminata, basi rotundata vel acutiuscula, 20–30 cm. longa, 5–8 cm. lata; nervi 23–30–jugati, paralleli, supra inconspicui, subtus prominentes; reticulationes utrinque indistinctae; petioli 1–2 cm. longi, supra valde canaliculati. *Flores masculi* in alabastris tantum visi, coriacei, obtuso-trigoni, extus flavo-brunnei tomentelli, intus atro-rubri, 5 mm. longi, 1 cm. lati; pedicelli 7 mm.—1.3 cm. longi, medio bracteolati; discus staminalis planus, triangularis 5 mm. latus, antheris 18–23 sessilibus coronatus; stipes 2–3 mm. longus. *Flores feminei* brevius pedicellati, pedicelli 4 mm. longi; ovarium tomentosum; stigma disciforme, 2-lobatum; lobus singulus iterum 5–6 lobatus. *Fructus* ignotus.

Tree 15–20 m. high. *Bark* dark grey, flaking in thin strips; sap copious. *Twigs* glabrous, angled at the tips, blackish in patches, grey and terete lower down. *Leaves* coriaceous, glabrous, oblong, the margins nearly parallel, dark green and glossy above, glaucous beneath, apex acuminate, base rounded or somewhat acute; nerves 23–30 pairs, parallel, faint and sunk above, prominent beneath; reticulations faint on both surfaces; length 20–30 cm.; breadth 5–8 cm.; petiole 1–2 cm. long, deeply grooved above. *Male flowers* not yet open, coriaceous, obtusely trigonous, yellowish brown and tomentulose outside, dark red inside, 5 mm. long and 1 cm. broad; pedicels 7 mm.—1.3 cm. long with a median bracteole; staminal disc flat, triangular, 5 mm. broad and on a 2–3 mm. long stalk; anthers 18–23 sessile. *Female flowers* with shorter, 4 mm. long pedicels; ovary rusty-tomentose; stigma disc-shaped with two main lobes, each lobe divided again into 5–6 minute lobes. *Fruit* unknown.

BORNEO SARAWAK: Left bank of Rejang River, 10 km. below Belaga, near Belaga airfield, Segaham Range, *M. Jacobs Nos. 5235* (CANB, L, SAR) and *5400* (CANB, L, SAR, SING).

EAST AND NORTH-EAST BORNEO: Karangan River, near Batu Pondong, Sangkulirang, *Kostermans 13694* (BO, K, L); West Kutei, *bb16562* (A, L) and S. Sentakan, Longbleh, *bb29574* (BO, L); Central Kutei, Pedohon River, near Tabang, *Kostermans 10635* (K, L, SING); E. Kutei, Pengadan, *bb12968* (BO); Inaran, Berouw, *bb12100* (BO); Berouw, *bb18927* (A, BO, L).

British North Borneo:	¼ mile S.W. of Sub-Cpt. 9, Cpt. 7, Bombay-Burmah T. Company Concession, Kalabakan, 30 mls. W.N.W. of Tawau, *Wood A3962* (K, KEP, L, SAN, SING); 15th mile, Elopura, Sandakan, *Puasa* and *Enggoh Nos. 10685* (K, L) and *55168* (KEP); Cpt. 14, Sepilok F.R., *Wood & Charrington SAN 15388* (KEP, L, SAN, SING); Cpt. 15, Sepilok F.R., *Sinclair* and *Kadim 9298* (A, B, BM, E, K, L, M, SAN, SING holotype).
DISTRIBUTION:	Northern and eastern part of Borneo.
TYPE MATERIAL:	*Sinclair* and *Kadim 9298* (SING holotype).

A tree of lowland forest and common in Central Kutei up to 100 m. altitude, named in honour of the late G. H. S. Wood, Forest Botanist at Sandakan. The flowers have a faint delicate scent (Jacobs). It is nearest to the Philippine *K. glomerata,* but differs in the more numerous nerves and anthers, the larger flowers and the longer male pedicels. It resembles to a less degree *K. korthalsii* and is more likely to be confused with the latter since both occur in Borneo. It differs from it in the fewer nerves, the slightly larger tomentulose (not tomentose flowers) with more anthers and from both species in the triangular staminal disc and in the glabrous twigs, angled at the apex, and often blackish from just below the apex for a short distance down.

Addenda

Since this paper went to the press, a large collection of *Myristicaceae* was received for naming from the Forest Department, Sarawak. They were collected mostly by J. A. R. Anderson and Hsiuan Keng (University of Malaya, Singapore) on a recent trip to Gunong Mulu, Sarawak, 4th Division during June–July 1961. They include, however, a few other collections made by members of the staff of the Forest Department, from various localities in Sarawak. Among the specimens are several plants collected for the first time in Sarawak, but occurring in other territories of Borneo as well, and some which are new and first records for the 4th Division of Sarawak, having been previously recorded from some of the other Sarawak divisions. The plants new to Sarawak are also, all from the 4th Division. Further an alpine variety of *Knema cinerea* with rigidly coriaceous leaves and prominent reticulations on the under surface of the leaves was obtained from Gunong Mulu. It deserves some mention so I now briefly describe it as a new variety of *K. cinerea,* first listing the other new records.

Fuller notes will have to be given at a later date in a special *nachtrag* of miscellanies in this present series of precursores for Flora Malesiana.

A. New and first records for Sarawak, all 4th Division, Gunong Mulu and vicinity:—

Knema curtisii var. *linguiformis; K. elmeri; K. furfuracea* (Sterile and on limestone. Probably a new variety. The tomentum on the innovations is much longer, stiffer and erect; hairs up to 2 mm. long); *K. kinabaluensis* (previously known from Mt Kinabalu only); *K. latericia* var. *albifolia.*

B. New and first records for the 4th Division of Sarawak, but previously known from some of the other divisions of Sarawak and from some of the other territories of Borneo:—

Knema ashtonii and *K. latifolia* (both from the Lambir Hills Forest Reserve) and *K. kunstleri* var. *kunstleri* from Bintulu and Miri.

C. Knema cinerea (Poir.) Warb.

var. **alpina** J. Sinclair, **var. nov.**

A *Knema cinerea* var. *sumatrana* cui proxima, haec varietas nova foliis rigide coriaceis, reticulationibus subtus laxioribus valde prominentibus, antheris paucioribus differt. In aspectu et forma foliorum *K. kinabaluensi* etiam aliquantum similis a qua nervis paucioribus irregulariter curvatis minus obliquis, supra minus elevatis, reticulationibus subtus magis distinctis, antheris stipitatis distinguitur.

Arbor 5–8 m. alta. *Folia* rigide coriacea, anguste lanceolata, lanceolata vel late lanceolata, 12–21 cm. longa vulgo 15 cm., 3.5–7 cm. lata vulgo 5 cm., basi acuta, saepe rotundata, apice acuta; nervi 12–18-jugati, vulgo 14-jugati, irregulariter curvati, sensim ad marginem ascendentes, in sicco subtus ferruginei; reticulationes supra visibiles, subtus valde elevatae dense dispositae; petioli 1–2 cm. longi, generaliter 1.5 cm. longi. *Flores masculi* extus minute ferrugineo-tomentelli; antherae 9–10, stipitatae (flores duos tantum dissecavi); pedicelli bracteola medio praediti. *Fructus* oblongus, ferrugineo-tomentellus, 2–3.5 cm. longus, 1.5–2.5 cm. latus, apice rotundatus vel obtuse apiculatus, secus suturam annulatus vel alatus vel levis (sine ala); stipes 5 mm.–1 cm. longus, tenuiusculus, 2–3 mm. crassus.

BORNEO SARAWAK:	Gunong Mulu, path from Melinau Paku, Baram District, 4th Division, *Anderson SAR Nos 4233* (A, BO, K, L, SAN, SAR, SING) 4,300 ft.; *4510* (BO, K, L, SAN, SAR, SING) 4,800 ft.; *4514* (A, K, L, SAN, SAR, SING) 4,400 ft.; *4566* (A, BO, K, L, SAN, SAR, SING) 3,700 ft.; *4600* (A, K, L, SAN, SAR, SING) 4,600 ft.
BRITISH NORTH BORNEO:	Ulu Moyah, 8 miles S.S.E. of Malaman, Sipitang, *Wood SAN 16669* (KEP, L, SAN, SING) 2,750 ft.
DISTRIBUTION:	Borneo as above.
TYPE MATERIAL:	*Anderson SAR 4514* (A, K, L, SAN, SAR holotype, SING).

The addition of this new variety will now bring the total numbers of varieties in *Knema* up to 14 instead of 13 as stated at the beginning of this paper. I have to transfer *Wood SAN 16669* from *K. cinerea* var. *sumatrana* to var. *alpina*. See under var. *sumatrana* and also in the notes after it where I have stated that perhaps I may have lumped too many specimens under *K. cinerea* var. *sumatrana*, including some from Borneo with narrower leaves than in typical var. *sumatrana*. See also in the introductory part under the heading *Polymorphic and Common Species* words to the same effect.

D. Finally, the rare *Knema rufa* was collected again in the 1st Division, in male flower, and the flowers were found to be red inside:—

Gunong Santubong (East) *Haji Bujang SAR 13146*.

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var. *cordata* (Sinclair) Sinclair = +
var. *patentinervia* (Sinclair) Sinclair = ^
var. *rubens* (Sinclair) Sinclair = area enclosed by dotted lines
var. *sumatrana* (Miq.) Sinclair = area enclosed by unbroken lines

Map 4. *Knema conferta* (King) Warb. = •
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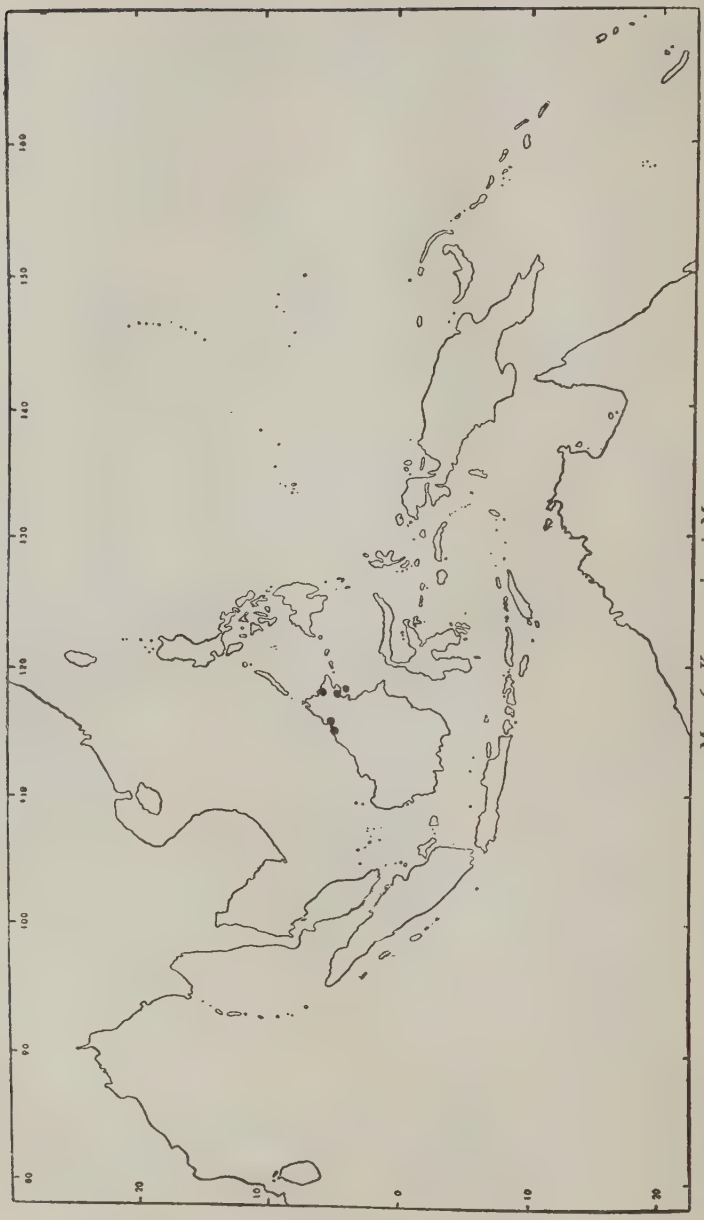
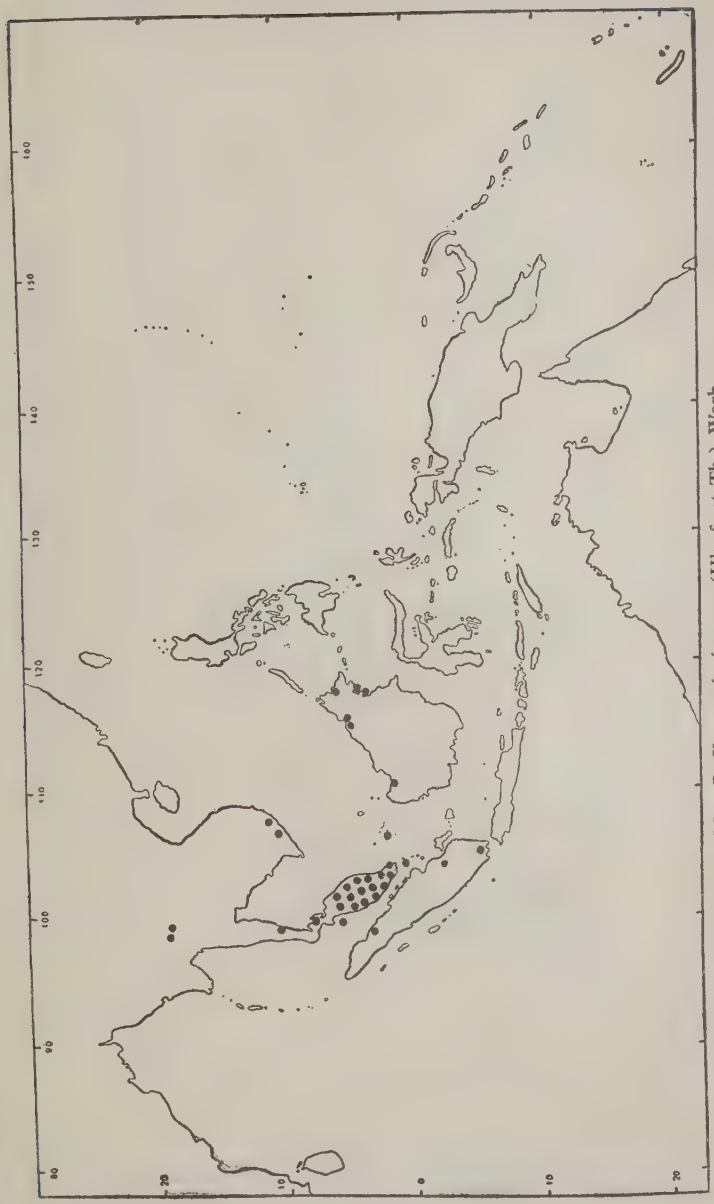
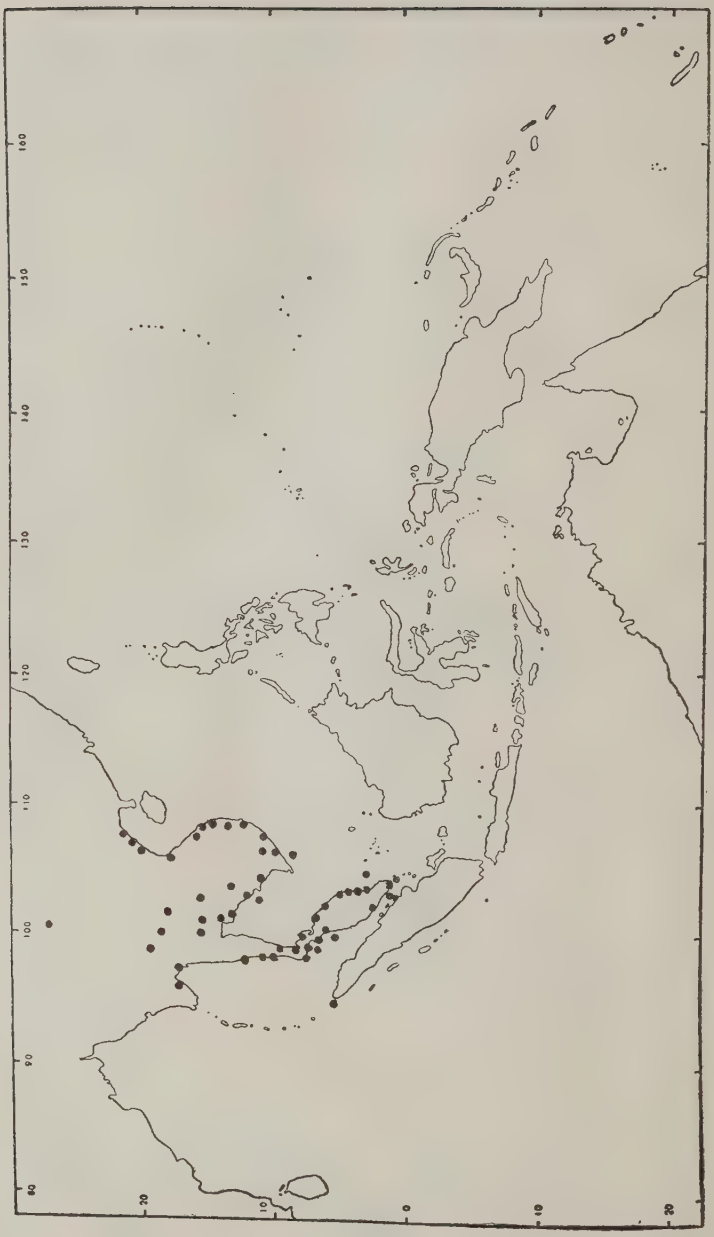
var. *amoena* J. Sinclair = ∧
var. *arenosa* J. Sinclair = •
var. *linguiformis* J. Sinclair = o
var. *paludosa* J. Sinclair = +



Map 6. *Knema elmeri* Merr.



Map 7. *Knema furfuracea* (Hk. f. et Th.) Warb.



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Map 10. *Knema hookeriana* (Hk. f. et Th.) Warb. = •
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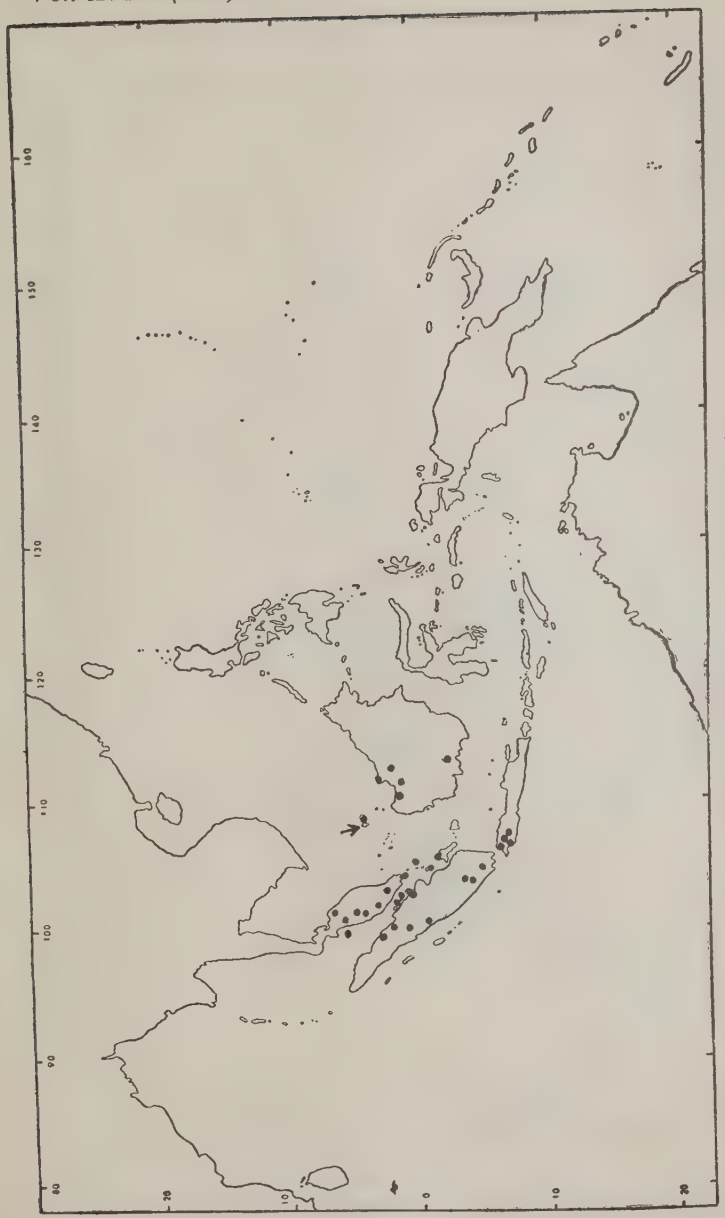
Knema linifolia (Roxb.) Warb. = o



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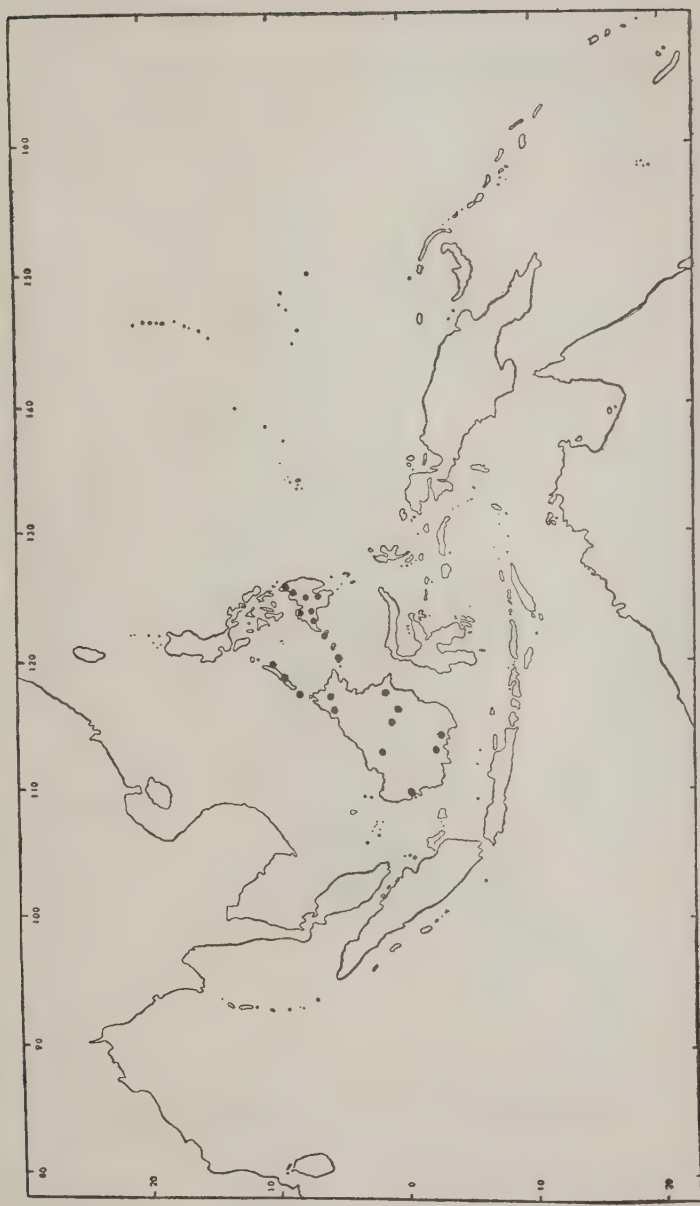

Map 13. *Knema korthalsii* Warb.

Map 14. *Knema kunstleri* (King) Warb.
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var. *surigaoensis* J. Sinclair = +

Map 15. *Knema latericia* Elmer
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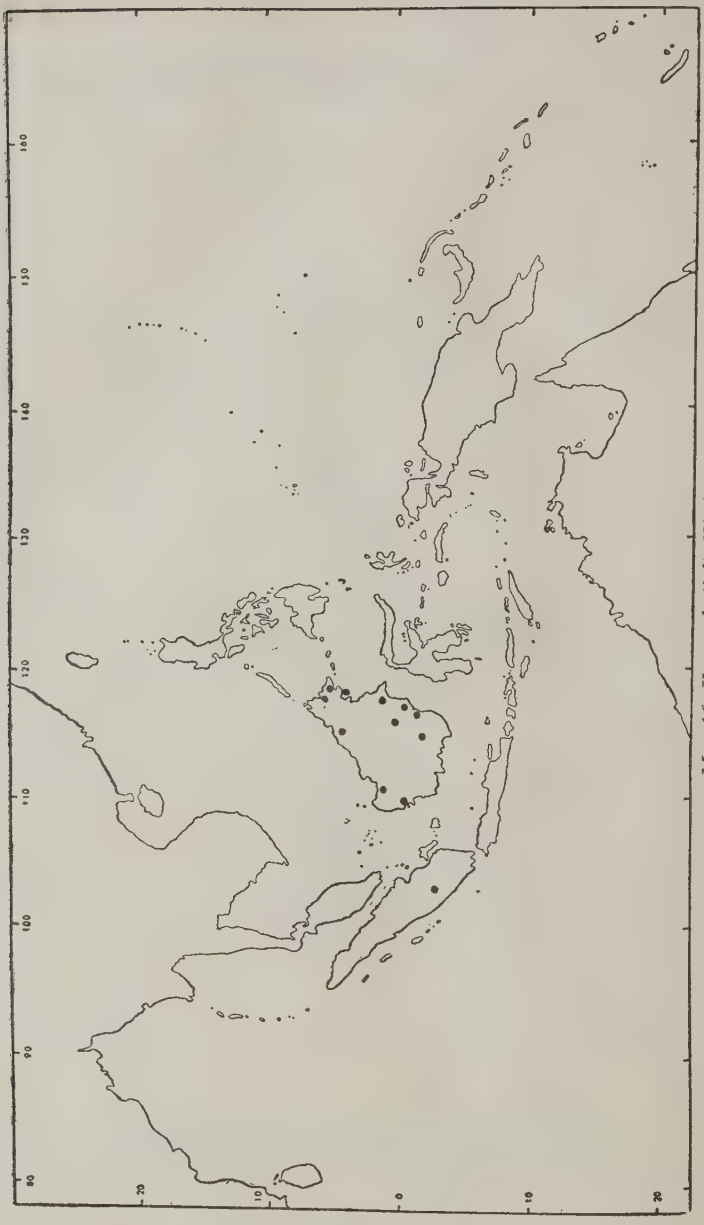
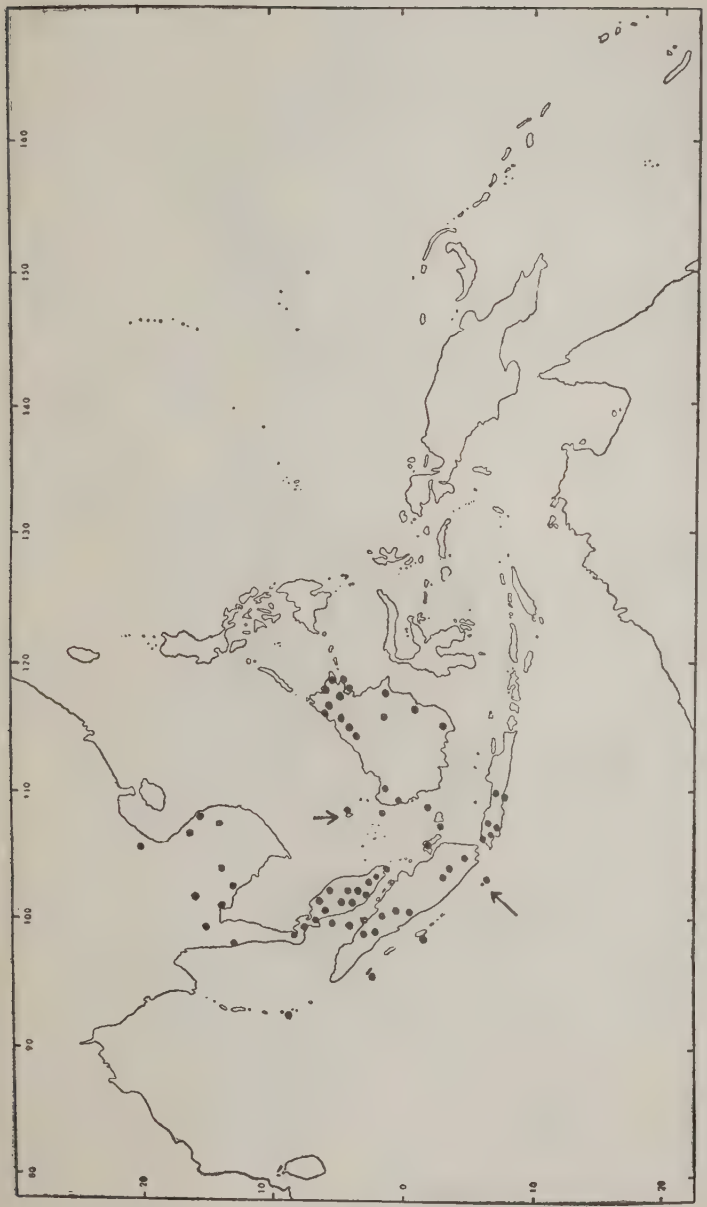
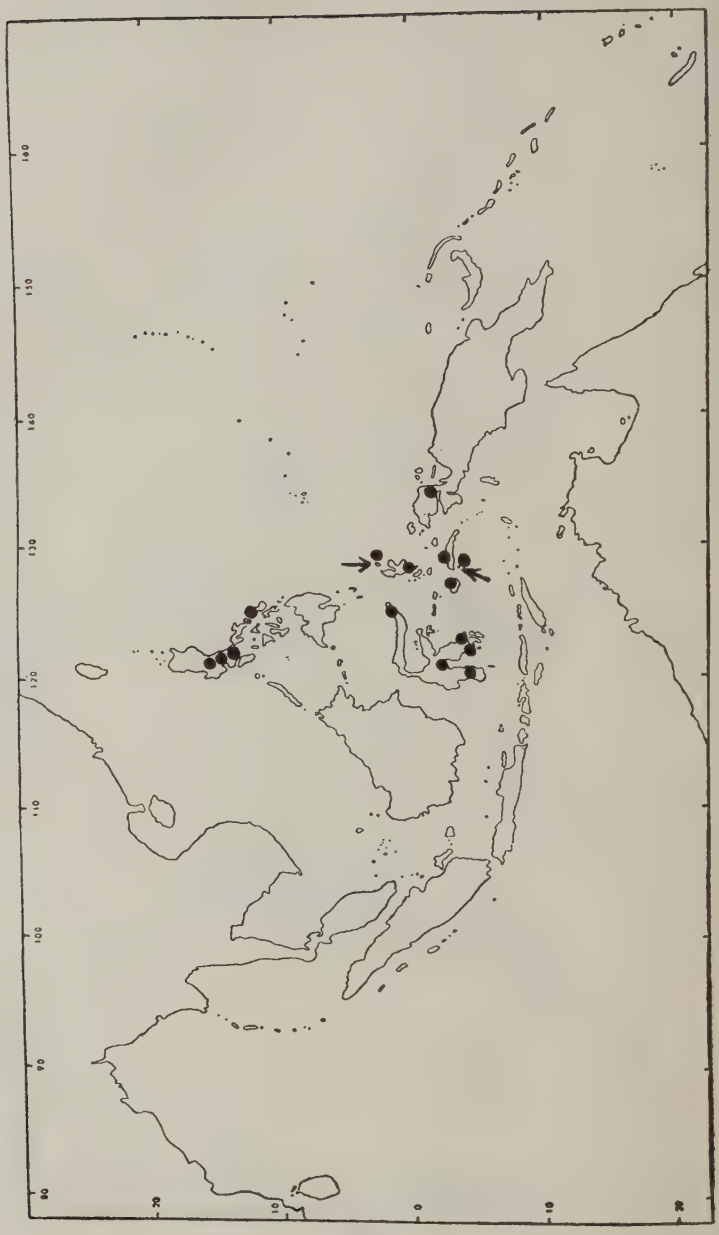
var. *alba* J. Sinclair = 3 circular areas
var. *lunduensis* J. Sinclair = +



Map 16. *Knema latifolia* Warb.



Map 17. *Knema laurina* (Bl.) Warb.



Map 18. *Knema tomentella* (Miq.) Warb.

LIST OF COLLECTORS' NUMBERS.

ACHMAD—63 laurina; 93 curtisii var. curtisii; 198 & 206 cinerea var. sumatrana; 643 laurina; 647 & 685 cinerea var. sumatrana; 790 curtisii var. curtisii; 840 cinerea var. sumatrana; 927 curtisii var. curtisii; 1139 & 1143 cinerea var. sumatrana; 1152 curtisii var. curtisii; 1176 cinerea var. sumatrana; 1195 laurina; 1459 cinerea var. sumatrana; 1492 curtisii var. curtisii; 1576 & 1579 cinerea var. sumatrana; 1803 curtisii var. curtisii; 1808 laurina.

ACUÑA—23377 korthalsii.

ADDURU—243 glomerata.

AGAMA—411 latericia var. latericia; 419 elmeri; 542 & 556 latericia var. latericia; 1003 laurina; 3990 curtisii var. linguiformis; 21605 korthalsii; 21612 latericia var. latericia.

AGUILAR—14301 & 24533 glomerata.

AHERN—393 & 589 korthalsii.

AHERN'S COLLECTOR—3192 glomerata.

ALAMBRA—23451 glomerata.

ALCASID & CELESTINO—7499 glomerata.

ALLEN—625 cinerea var. sumatrana but latericia var. latericia is also mounted on the A sheet; 628 cinerea var. sumatrana.

ALSTON—16205 cinerea var. cinerea; 16910 tomentella.

ALVAREZ—21444 glomerata; 22395 & 22397 tomentella; 22641 kunstleri var. kunstleri.

AMDJAH—141 curtisii var. curtisii; 144 curtisii var. linguiformis; 170 ashtonii; 171 cinerea var. sumatrana; 191 latericia var. latericia; 204 curtisii var. curtisii; 309 cinerea var. cordata; 343 cinerea var. sumatrana; 440 korthalsii; 696 cinerea var. cordata; 934 & 941 cinerea var. sumatrana.

ANANG—542 tomentella.

ANDERSON, J. A. R.—SAR Nos. 412 intermedia; 447 uliginosa; 2047 furfuracea; 2135; 2638; 2853 & 3178 kunstleri var. kunstleri; 3184 & 3185 intermedia; 4855 galeata; 4946 latericia var. latericia; 5551 kunstleri var. kunstleri; 7062 galeata; 7931 intermedia; 8518 & 9019 kunstleri var. kunstleri; 9039 & 9055 intermedia; 9893 uliginosa.

ANDERSON, T.—10 hookeriana.

AÑONUEVO—13563 glomerata; 13735 korthalsii.

APOSTAL—2395 korthalsii.

ARIZABAL—30500 kunstleri var. kunstleri.

ARSAT—1065 latericia var. latericia.

ASHTON—BRUN Nos. 157 latifolia; 588 cinerea var. sumatrana; 865 elmeri; 945 galeata; 5164 percoriacea; 5202 ashtonii; 5270 percoriacea; 5587 curtisii var. curtisii.

ASHTON, SMYTHIES & WOOD—SAR No. 5847 kunstleri var. kunstleri. SAN Nos. 17080 percoriacea; 17085 laurina; 17111 furfuracea; 17127 membranifolia; 17386 & 17387 ashtonii; 17401 cinerea var. sumatrana; 17402 furfuracea; 17428 kunstleri var. kunstleri; 17504 furfuracea.

ASHTON & WHITMORE—BRUN Nos. 636 galeata; 686 kunstleri var. kunstleri.

ATASRIP—62 & 89 tomentella.

ATJE—368 cinerea var. cinerea.

BA PE, (MAUNG)—842; 845 & 11678 linifolia; 12909 cinerea var. andamanica.

BACKER—8835 & 10022 laurina; 11788; 11954 & 18330 cinerea var. sumatrana; 18581 laurina; 18687 cinerea var. sumatrana; 23135 & 23197 laurina; 25964 cinerea var. sumatrana; 26257 laurina; 29964 & 30629 cinerea var. sumatrana; 31193 laurina.

BAKER—220 cinerea var. andamanica; 3309 glomerata; 5641 & 5644 globularia.

BAKHUIZEN v.d. BRINK—438 cinerea var. sumatrana; 613 & 896 laurina; 3001; 3794 & 3796 cinerea var. sumatrana; 4178 & 4208 laurina; 5064 intermedia; 5214 & 5287 laurina; 6141 & 6381 intermedia; 7793 laurina.

BALAJADIA—4054 laurina.

BALANSA—1012 globularia; 4175 & 4176 laurina; 4196 & 4198 globularia; 4199 laurina.

BALLESTEROS—9474 glomerata.

BAÑAGA—33399 glomerata.

BANGHAM, W. N. & C. M.—652 cinerea var. sumatrana.

BARBER—2940; 2953; 3121 & 5671 attenuata.

BARNES—500 glomerata.

BARNTON—515 kinabaluensis.

BARTLETT—7329 intermedia; 13476 glomerata.

BAWAN—24613 glomerata

bb Nos.—1200 conferta; 2329 tomentella; 3770 curtisii var. paludosa; 5429 & 5430 cinerea var. cinerea; 6214 mandaharan; 6578 cinerea var. sumatrana; 6823 & 7200 mandaharan; 7290 cinerea var. sumatrana; 7430 mandaharan; 8319 percoriacea; 8634 mandaharan; 8846 cinerea var. sumatrana; 9160 laurina; 9186 cinerea var. rubens; 9366 furfuracea; 9369 conferta; 10130 tomentella and G. paniculata var. zippeliana; 10335 scortechinii; 10570 conferta; 10756 elmeri; 12100 woodii; 12270 mandaharan; 12744 korthalsii; 12968 woodii; 13019 galeata; 13107 conferta; 13727 laurina; 14356 cinerea var. cinerea; 14646 curtisii var. arenosa; 14871 & 14872 latericia var. albifolia; 15087 tomentella; 15562 mandaharan; 16406 conferta; 16562 woodii; 16738 conferta; 17178 tomentella; 17487 & 18174 curtisii var. arenosa; 18927 woodii; 19392 & 20376 conferta; 22410 mandaharan; 23801 tomentella; 24279 & 24426 cinerea var. cinerea; 24649 menbranifolia; 26185 percoriacea; 26188 conferta; 26354 cinerea var. sumatrana; 26984; 27497; 27591; 29300; 29340; 29356 & 29518 conferta; 29574 woodii; 34455; 34467 & 34469 percoriacea; 34623 curtisii var. arenosa.

Beccari—532 cinerea var. sumatrana; 632 laurina; 670 kunstleri var. kunstleri; 901 intermedia; 1094 cinerea var. sumatrana; 1396 cinerea var. patentinervia f. longipedicellata; 1546 laurina; 1594 latericia var. albifolia; 1607 pectinata; 1609 cinerea var. rubens; 1618 latericia var. albifolia; 1709 cinerea var. patentinervia f. longipedicellata; 1798 rufa; 1815 communis; 1824 latifolia; 1960 communis; 1991bis latifolia; 2003 latericia var. latericia; 2482 cinerea var. rubens; 2523 latericia var. latericia; 5618 cinerea var. sumatrana; 7760; 7761 & 7762 intermedia; 7770; 7771 & 7772 tomentella; 7778; 7778a; 7779; 7780=632; 7781; 7781a; 7782 & 7782a laurina; 7788 & 7788a cinerea var. sumatrana; 7789 & 7789a tomentella; 7792 cinerea var. sumatrana.

Becking—50 conferta; 54 & 145 cinerea var. sumatrana.

Beddome—101 globularia; 103; 215 & 222 attenuata; 6728 globularia.

Bejaud—344 & 665 globularia.

Belen—23328 korthalsii.

Bernardo—24271 glomerata.

Beumee—574 cinerea var. sumatrana; 863 curtisii var. curtisii; 3687; 3881 & 6079 cinerea var. sumatrana.

Bijhouwer—268 laurina.

Biswas—2064; 3766 & 4987 linifolia.

Blume—(24); (54) & 1629 laurina.

Boejeng b. Sitam—SAR 9302 kunstleri var. kunstleri.

Bon—307; 1435; 1540; 1643; 3182; 3363; 4142; 4210; 4332; 5102 & 6106 globularia.

Boot—3311a cinerea var. sumatrana.

Bor—8780; 9387; 9391; 11180 & 11554 attenuata; 17838 & 18387 erratica.

Borja—28139 glomerata.

Borden—625; 1180; 1372; 1655; 1663; 2556; 2723; 2940 & UC accession Nos. 239236 & 239547 glomerata.

Bourdillon—431; 432; & 505 attenuata.

Brandis—392; 409 & 692 cinerea var. andamanica.

Brinkman—655 cinerea var. sumatrana; 670 laurina.

Brooke—10696 uliginosa.

Bruinier—209; 240 & 274 intermedia.

Brünig—SAR 1177 galeata.

Bukah—A3433 latericia var. albifolia.

Bünnemeijer—2036 cinerea var. patentinervia.

Burkill, I. H.—37607 linifolia.

Buurman v. Vreeden, W.—136 & 137 cinerea var. patentinervia.

Buwalda—207 cinerea var. cinerea; 3583 & 3625 cinerea var. sumatrana; 3804; 4158 & 4801 cinerea var. cinerea; 6448 cinerea var. sumatrana; 6736; 6782 & 6968 cinerea var. sumatrana; 7658; 7741; 7743; 7768 & 7769 uliginosa; 7820 intermedia; 7937 korthalsii:

Calder—1460 attenuata.

Calder & Ramaswami, M. S.—403 & 1588 attenuata.

Canicosa—9719 glomerata.

Castillo—646 cinerea var. sumatrana.

Castro—4503 latericia var. latericia; 7275 curtisii var. linguiformis.

Castro & Melegrito—1451 cinerea var. sumatrana.

Cel Nos.—CEL I/2 cinerea var. cinerea; CEL II/318 & CEL III/112 tomentella.

Celestino & J. Ramos—23002 korthalsii; 23062 latericia var. latericia.

CENABRE—29232; 29973 & 30099 korthalsii.

CHEVALIER—36744 & 36762 furfuracea; 36875; 37054; 38283; 38438; 38566 & 39179 globularia.

CHIN—252 cinerea var. andamanica.

CHIT—354; 396 & 831 globularia.

CLARK—1086 glomerata.

CLARKE—36267; 40679e & 42324a linifolia; 42348 & 42361 erratica; 43779 cinerea var. andamanica.

CLEMENS—964 & 1111 glomerata; 3467 laurina; 3864 globularia; 4191 cinerea var. andamanica; 4377 globularia; 8354; 10334 & 10342 kinabaluensis; 20016 cinerea var. patentinervia f. longipedicellata; 20086 latericia var. latericia; 20345 cinerea var. patentinervia f. longipedicellata; 20346 latericia var. latericia; 21206 cinerea var. patentinervia f. longipedicellata; 21207 & 21208 curtisii var. curtisii; 21209 percoriacea; 21599 muscosa; 21600 & 22119 cinerea var. sumatrana; 22120 muscosa; 22291 curtisii var. paludosa; 22539 latericia var. latericia; 26697 & 26697a kinabaluensis; 28325 latericia var. latericia; 28354 kinabaluensis; 28766 cinerea var. sumatrana; 29358; 29358bis; 29515; 30283 & 30321 kinabaluensis; 30505 & 30888 cinerea var. sumatrana; 31406 & 31608 kinabaluensis; 32027; 32156 & 32202 cinerea var. sumatrana; 32498 kinabaluensis; 32852 cinerea var. sumatrana; 33032; 33038; 34094; 34292 & 40545 kinabaluensis; 42885 korthalsii; 50012 kinabaluensis; 50432 curtisii var. linguiformis; 50433 latericia var. latericia.

COLLETT—70 cinerea var. andamanica; 98 linifolia.

COLLINS—583 & 817 globularia; 857 erratica; 1775 globularia; 1939 erratica; 1941 globularia.

CONKLIN—17441 & 37576 glomerata.

CORNER—S.F.N. 26155 curtisii var. paludosa.

COWAN—2 linifolia; 1460 cinerea var. andamanica.

CUADRA—A1110 & A2407 laurina.

CUBIT—619 cinerea var. andamanica.

CUMING—844; 1042 & 1309 glomerata; 2315 globularia.

CURRAN—5996; 10436 & 10477 glomerata; 10573 kunstleri var. kunstleri; 17317 & 17462 glomerata.

DAKUS—205 laurina.

Daud & Tachun—S.F. Nos. 35627 cinerea var. patentinervia f. longipedicellata; 35739 curtisii var. curtisii; 36081 cinerea var. sumatrana; 36113 membranifolia.

Dent—94 linifolia; 95 cinerea var. andamanica.

Dickason—5394; 5394a; 5542; 5585; 5679; 5828 & 6689 cinerea var. andamanica; 6813 globularia.

Din—204 linifolia; 316 globularia.

Dorst—TIP 751 curtisii var. paludosa.

Dumas—1617 conferta.

Edaño—3241 glomerata; 14233 latericia var. latericia; 45971 glomerata; 77780 & 77789 korthalsii; 78242; 79484; 79136 & 79374 glomerata.

Elbert—1950; 3396 & 3812 cinerea var. cinerea.

Elgincolin & Ranario—27765 glomerata.

Ellias—SAR 8030 kunstleri var. kunstleri.

Elmer—6156; 8228; 8957; 10132; 10960; 10990; 11935 & 12200 glomerata; 12262 kunstleri var. kunstleri; 12757 latericia var. latericia; 14040 korthalsii; 16229; 16616 & 17565 glomerata; 20809 latericia var. latericia; 20895 latericia var. albifolia; 21017 laurina; 21040 latericia var. albifolia; 21042 elmeri; 21409 & 21410 latericia var. albifolia; 21527 elmeri.

Enchai & Enggoh—9394 latericia var. latericia; 10377 latifolia; 44569 latericia var. latericia; 49151 latifolia.

Endert—59 cinerea var. sumatrana; 2281 laurina; 2434 latericia var. albifolia; 2436 laurina; 2557 cinerea var. sumatrana; 2586 curtisii var. curtisii; 2713 latifolia; 2721 cinerea var. cordata; 2822 cinerea var. sumatrana; 3018 curtisii var. curtisii; 3046 cinerea var. cordata; 3062 curtisii var. curtisii; 3141 cinerea var. cordata; 3158 latifolia; 3178 & 3342 latericia var. latericia; 3559 curtisii var. linguiformis; 4775 ashtonii; 4824 galeata; 4846 & 4889 latifolia; 4932 laurina; 5063 conferta; 5113 latericia var. albifolia; 189E1P905 malayana.

Enggoh—7250 latericia var. latericia; 10466 curtisii var. linguiformis.

Esben—34287 glomerata.

Espinosa—6418 glomerata.

Evangilista—878 latericia var. latericia; 949 laurina; 1109 cinerea var. sumatrana.

Fabia—A4003 latericia var. latericia.

FAIRCHILD—1046 curtisii var. curtisii.

FALCONER—207 & 210 cinerea var. andamanica; 546 linifolia.

FENIX—4049; 28026 & 28277 glomerata.

FISCHER—4545 attenuata.

FLEURY—30009; 30114; 30145; 38000 & 39348 globularia.

FORBES—295 laurina; 486 cinerea var. sumatrana; 542a intermedia; 545a laurina; 592 cinerea var. sumatrana; 1306 & 1409 laurina; 2466 cinerea var. sumatrana; 2573 intermedia; 2606 cinerea var. sumatrana; 2683 laurina; 2694 furfuracea; 2718 & 2916 cinerea var. sumatrana; 2997 latifolia; 3141 cinerea var. sumatrana; 3188 latifolia; 3193 curtisii var. curtisii.

FOREST DEPARTMENT NORTH BORNEO—F.D. 49116 korthalsii.

FORESTRY STUDENT—34126 glomerata.

FOXWORTHY—1590 glomerata.

FRAKE—38112 & 38259 glomerata.

FRANCK—473 glomerata.

DE FRETES—5745 tomentella.

GAGE—114 erratica; 123 cinerea var. andamanica; 152 linifolia.

GALLATLY—837 & 898 cinerea var. andamanica.

GAMBLE—483b, d & g linifolia; 2306a; 2307a; 2308a & 6759a cinerea var. andamanica; 6761a & c linifolia; 6768a cinerea var. andamanica; 7940 & 7941 linifolia.

GIBBS—2803 korthalsii.

GOKLIN—F.D. 3022 cinerea var. sumatrana.

GOODENOUGH—3376 curtisii var. paludosa.

GRASHOFF—101 conferta; 737 cinerea var. patentinervia; 1019 cinerea var. cordata; 1148 laurina.

GRIFFITH—282 linifolia; 692 globularia; 4342 hookeriana; 4343 malayana; 4344 globularia; 4345 conferta & linifolia; 4346 furfuracea; 4347 erratica; 4348 cinerea var. andamanica; 4349 cinerea var. sumatrana; 4359 intermedia.

GUERRERO—30364 glomerata.

GUTIERREZ—3487 tomentella.

HAINES—443 linifolia.

HALLIER—8 cinerea var. sumatrana; 85 uliginosa; 323 two separate collections, cinerea var. sumatrana and laurina; 766 & 1084 laurina; 1125 & 1192 cinerea var. sumatrana; 2102 & 2207 uliginosa; 2766 korthalsii; 2994 & 3013 cinerea var. cordata; 3358 curtisii var. curtisii.

Haniff—376 globularia.

Haniff & Nur—S.F.N. 2061 linifolia.

Harmand—602; 771 & 937 globularia.

Haviland—526/295 korthalsii; 634 laurina; 1036 (Garai) cinerea var. sumatrana; 1440/1086 & 1967 intermedia; 2254/1761 kunstleri var. kunstleri; 3307 latericia var. latericia.

Hayata—376 globularia.

H.B.=(Herb. Bogor, generally Teijsmann & less frequently Diepenhorst)—478 intermedia; 1754 cinerea var. sumatrana; 3056 laurina; 3057 & 3060 cinerea var. sumatrana; 3091 mandaharan; 3484 latericia var. latericia; 3550 & 3735 cinerea var. sumatrana.

Heinig—218 cinerea var. andamanica.

Henderson—S.F. Nos. 20250 & 20372 furfuracea.

Henry—11780; 11780a & 11780b erratica.

Herb. Heyneanum—6423a attenuata.

Hildebrand—8 laurina.

Hoffmann—6541 & 6609 cinerea var. sumatrana.

Holman—81 glomerata.

Hooker Fil. & Thomson—126; 128; 566 & 1038 linifolia; 1040 erratica; 1082 cinerea var. andamanica.

Horsfield—1bis laurina.

Hort. Bog. Cultivated—IVG 83 & IVG 93 cinerea var. sumatrana; HG 85 intermedia.

Hullett—793 laurina.

Hulstijn—368 cinerea var. cinerea.

Hutchinson—108; 3961 & 3985 korthalsii; 6110 & 7560 glomerata.

Iboet—159 furfuracea; 164 cinerea var. sumatrana; 178 laurina; 400 cinerea var. sumatrana.

Ilagan—35487 glomerata.

Ja Nos.—1502; 1547; 1790; 2036 & 2448 cinerea var. sumatrana; 2502 laurina; 2505; 2533; 2919; 6171; 6192; 6202; 6574; 6610; 6611; 6615; 6676; 6688 & 6786 cinerea var. sumatrana; 6886 intermedia.

Jacobs, M.—5030 cinerea var. cordata; 5081 cinerea var. sumatrana; 5100 cinerea var. cordata; 5112 pectinata; 5223 curtisii var. curtisii; 5235 woodii; 5355; 5356 & 5393 latericia var. albifolia; 5400 woodii.

JAGARMANI—495 linifolia.

JAHERI—129 cinerea var. sumatrana; 354 curtisii var. curtisii; 611 ashtonii; 619 cinerea var. sumatrana; 740 latifolia; 914 latericia var. latericia; 927 latericia var. albifolia; 984 latifolia; 1133 & 1755 cinerea var. sumatrana.

JIMENEZ—27048 korthalsii.

JUNGHUHN—(15) cinerea var. sumatrana; (56) & (57) laurina; 558 cinerea var. sumatrana; 560 laurina; 561 cinerea var. sumatrana; 716 laurina.

KADIM b. TASSIM—287 curtisii var. paludosa.

KADIR—A934 conferta; A988 & F.D. 10219 latifolia.

KADIR & ENGGOH—10342 korthalsii.

KAHAR—10219 latifolia.

KAMPHφVENER—2804 glomerata.

KANEHIRA—2511 korthalsii.

KANJILAL, U.—1893 & 4050 erratica; 4705 linifolia; 6275 erratica; 4804 attenuata.

KAPIS b. SISIRON & WONG, MICHAEL—SAN 17260 laurina.

KEITH—9284 & 44481 latericia var. latericia.

KEP. F. NOS.—68774 hookeriana; 80695 kunstleri var. kunstleri.

KERR—2120 laurina; 2518 furfuracea; 3122; 5159; 5470 & 5547 cinerea var. andamanica; 5621 furfuracea; 5842 globularia; 6446 & 6447 cinerea var. andamanica; 6863 globularia; 8168; 8193 & 8311 globularia; 9383 erratica; 9430 & 9553 globularia; 9849 & 10423 laurina; 11169 & 11650 globularia; 11663 cinerea var. andamanica; 12524; 12699; 12786 & 13852 globularia; 13990 laurina; 14080; 14735 & 15127 globularia; 15156 laurina; 15309 cinerea var. sumatrana; 16016 globularia; 16326 laurina; 16599 & 16686 globularia; 16818 laurina; 17078 cinerea var. sumatrana; 17607 erratica; 17671; 18556 & 18906 globularia.

KHAN, M.S.A.—41 attenuata.

KIAH—S.F. Nos. 37123 & 37148 curtisii var. paludosa.

KING—97; 125; 412 & 496 linifolia; 536 cinerea var. andamanica; 605 & 2346 linifolia; 2439 erratica; 5084 linifolia.

KIRAT RAM—3658 cinerea var. andamanica.

KJELLBERG—621 tomentella; 1131 cinerea var. cinerea; 1608; 1807; 2006 & 2494 tomentella.

KLEMME—2090 also numbered 7058 glomerata; 11266 glomerata (acuminata) not seen; 13417 glomerata.

KLOSS, C. BODEN—6936 laurina; S.F. Nos. 13092 laurina; 14496 & 14569 cinerea var. sumatrana; 19002 laurina; 19066 furfuracea; 19186 latifolia.

KOORDERS—3491 & 3492 cinerea var. sumatrana; 5238; 5239; 5240 & 5242 intermedia; 5243; 5244; 5245 & 5247 cinerea var. sumatrana; 5248 intermedia; 5250 & 5251 laurina; 5253; 5254; 5255 cinerea var. sumatrana; 5256 laurina; 5257; 5258 & 5259 cinerea var. sumatrana; 5260 laurina; 5262 intermedia; 5263 cinerea var. sumatrana; 5267 intermedia; 5269 & 5273 cinerea var. sumatrana; 5274 & 5275 laurina; 5276 cinerea var. sumatrana; 5277 laurina; 5278 & 5279 cinerea var. sumatrana; 5280 laurina; 5281; 5282; 5283; 5285; 5286; 5287; 5288; 5289; 5290; 5291; 5292; 5293; 5295; 5298 & 10382 cinerea var. sumatrana; 10385 cinerea var. cordata; 10531 cinerea var. sumatrana; 10532 globularia; 11197 laurina; 11790 intermedia; 11791 cinerea var. sumatrana; 11793 intermedia; 11794; 12046; 12048; 12174; 12183 & 12212 cinerea var. sumatrana; 12277 & 12294 intermedia; 12399; 12404; 12423; 13084; 13147; 13148; 13257; 13270; 13335; 13561; 14258; 14616; 14617; 14618; 14619 & 15670 cinerea var. sumatrana; 15522 intermedia; 15670 cinerea var. sumatrana; 17498 & 18130 cinerea var. cinerea; 18132 tomentella; 18134; 18135 & 18140 cinerea var. cinerea; 18152; 18167 & 18169 tomentella; 20084; 20286; 21051; 21607; 21634; 21907; 21913; 22777; 22838; 23513 & 23943 cinerea var. sumatrana; 24031 laurina; 24289; 24291; 24686, 25620; 25635; 25732 & 25779 cinerea var. sumatrana; 26924 & 26936 laurina; 26938 & 26940 cinerea var. sumatrana; 26942 laurina; 27158; 27184; 27481; 28613; 29021 & 30294 cinerea var. sumatrana; 30470 intermedia; 30472 cinerea var. sumatrana 31018 laurina; 32291 & 32714 cinerea var. sumatrana; 33063 intermedia; 33082 cinerea var. sumatrana; 33122 intermedia; 33419 & 33441 laurina; 33572; 33609; 33866 & 33889 cinerea var. sumatrana; 33939 & 37501 laurina; 38902 & 39343 cinerea var. sumatrana; 40511 laurina; 42238 cinerea var. sumatrana; 42239 & 42783 laurina; 44595 & 52548 cinerea var. sumatrana.

KORTHALS—(17) cinerea var. sumatrana; (25) laurina; (99) curtisii var. arenosa.

KOSTERMANS—28 furfuracea; 646 tomentella; 3555 cinerea var. cordata; 4046 conferta; 4060 percoriacea; 4094 galeata; 4164 percoriacea; 4301 latifolia; 4327 cinerea var. sumatrana; 4382 membranifolia; 4436 latifolia; 4535 percoriacea; 4745 tomentella; 4831 laurina; 4854 & 4869 membranifolia; 4927 curtisii var. arenosa; 5103 & 5209 cinerea var. cordata; 5233 latericia var. latericia; 5351 cinerea var. sumatrana; 5355 cinerea var. cordata; 5449 latericia var. latericia; 5568 cinerea var. cordata; 5690 latericia var. albifolia; 5755 korthalsii; 5778 & 6713 latifolia; 6730 & 6731 percoriacea; 7062 galeata; 7367 laurina; 7396 latericia var. latericia; 7942 curtisii var. linguiformis; 7964 latericia var. latericia; 8634 conferta; 8636 latifolia; 8653 curtisii var. arenosa; 8662 & 8686 conferta; 8903 laurina; 8934 conferta; 8948 & 8950 laurina; 9017 and 9059 conferta; 9121 latifolia; 9130 conferta; 9536 membranifolia; 9667 laurina; 9762 cinerea var. cordata; 9764 curtisii var. arenosa; 9880 & 9945 percoriacea; 9948 cinerea var. sumatrana; 10148 latifolia; 10194 curtisii var. arenosa; 10286 & 10359 conferta; 10415 cinerea var. cordata; 10451 & 10559 cinerea var. sumatrana; 10635 woodii; 10713 furfuracea; 12577 cinerea var. sumatrana; 12800 conferta; 12816 latifolia; 13355 korthalsii; 13694 woodii; 13721 latericia var. latericia; 13900 cinerea var. sumatrana.

KOSTERMANS & ANDONG—5 laurina.

KOSTERMANS & ANTA—184 intermedia; 652 cinerea var. sumatrana; 691 latericia var. latericia; 922 cinerea var. sumatrana and also cinerea var. patentinervia mounted on the L sheet; 1181 laurina; 1299 cinerea var. sumatrana.

KOSTERMANS, KUSWATA, SOEGENG & SOEPADMO—238; 285 & 298 cinerea var. sumatrana.

KOSTERMANS & VAN WOERDEN—85 laurina.

KRUKOFF—4082 mandaharan; 4087 cinerea var. rubens; 4289 & 4445 hookeriana.

KUNTZE—4996 laurina.

KURZ—983 cinerea var. andamanica; 985 linifolia; 1522 intermedia; 2431 cinerea var. andamanica; 2432 & 2433 linifolia; 26088 laurina.

LACE—4649 linifolia; 4762 cinerea var. andamanica; 4801 laurina; 5093 cinerea var. andamanica.

LAKSHNAKARA—440 globularia; 508 cinerea var. andamanica; 509 globularia; 754 malayana.

LAMANILAO—34269 glomerata.

LAMBACH—1296 cinerea var. sumatrana; 1335 hookeriana; 1348 intermedia.

LAURIE—5474 attenuata.

LAWSON—93 attenuata.

LEEUWEN, DOCTERS v.—2285 & 2873 laurina.

LEEUWEN, D.v. & SMITH, J.J.—545 laurina.

LEIBERG—6152 glomerata.

LISTER—47; 74; 336 & 382 linifolia.

LOBB—315 intermedia.

LOHER—6702; 6711; 6712; 6713; 6714 & 6720 glomerata; 12390; 12630 & 13390 tomentella.

LÖRZING—4585 mandaharan; 4623 curtisii var. curtisii; 5258 hookeriana; 5538 laurina; 5780 cinerea var. sumatrana; 7467 cinerea var. rubens; 7512 hookeriana; 10124 curtisii var. curtisii.

LOW—FI acc. Nos. 7787; 7787a; 7787b & 7787c furfuracea.

LÜTJEHARMS—4421 laurina.

MAIDIN, MD—1737 & 4145 latericia var. latericia.

MAIN—2065 cinerea var. patentinervia f. longipedicellata; 2067 latifolia; 2098 uliginosa.

MAJUYAP—10169 & 48943 latifolia; 55250 furfuracea.

MANN—345 erratica.

MANUEL—21639 glomerata.

MARADJO—57 cinerea var. sumatrana; 279 laurina.

MARCAN—1386 laurina.

MARIANO—27159 laurina.

MASTERS—1122 & 1400 linifolia.

MAUNG THY—2371 linifolia.

MCGREGOR—245; 10344; 18576 & 22974 glomerata.

MCLEAN, CATALAN & PERALTA—129 kunstleri var. kunstleri.

MEDINA—23537 glomerata.

MEEBOLD—8568 attenuata; 15182 & 17027 linifolia.

MEIJER, W.—1874 conferta; 2081; 2094; 2161 & 2184 laurina; 2327 elmeri; 2521 curtisii var. curtisii; 2533 furfuracea; 2590a curtisii var. curtisii; 4075 mandaharan; SAN 19436 korthalsii.

MELEGRITO—A4247 laurina.

MENDOZA—4291 laurina.

Merrill—504 & 2533 glomerata; 9764 korthalsii.

Meyer, R.—2815 glomerata.

Meyer & Foxworthy—13569 glomerata.

Miranda—11880 & 18942 korthalsii.

Mohr, v.d. Meer—82 laurina.

Mondi—205 laurina.

Motley—113 latericia var. latericia; 1146 korthalsii.

Moulton—S.F.N. 6722 laurina.

Mousset—1139 cinerea var. sumatrana.

Muller—367; 898 & 1002 globularia.

Native Collector, Sarawak—164 kunstleri var. kunstleri; 2483 latericia var. latericia; 2648 membranifolia; 5280 korthalsii.

Nicholson & Charrington—SAN 17749 latifolia.

Nicholson & Patrick Ping Sam—SAN 17682 latifolia.

Noerkas—447 cinerea var. cinerea.

Ocampo—27913 glomerata.

Onggib—9395 & 44570 latericia var. latericia; 49055=(10281) galeata.

Oro—30833 glomerata.

Otik—4913 latericia var. latericia.

Paraiso—26280 glomerata.

Parker—2237 linifolia.

Parkinson—93; 284; 315; 348 & 630 cinerea var. andamanica; 392 linifolia; 706; 712 & 764 cinerea var. andamanica; 1995 & 2065 globularia; 5012 linifolia.

Pascual—10181 latericia var. latericia; 28794 glomerata.

Patil—2537 attenuata.

Paymans—1 & 2 conferta; 52 laurina; 61 & 74 conferta; 83 latericia var. albifolia; 127 conferta.

Peal—90 & 142 linifolia.

Pella—60 tomentella.

Pennek, Sutan—101 conferta.

Peralta—35480 glomerata.

Petelot—1546; 2625; 5375; 5683; 5720; 5825 & 6608 globularia.

Phung v. Dien—135 globularia.

Pickles—SAR Nos. 3405; 3477 & 3611 laurina; 3624; 3738 & 3757 cinerea var. sumatrana; 3850 latericia var. latericia.

PING SAM, PATRICK—SAN Nos. 1883 latericia var. albifolia; 19211 korthalsii.

PIERRE—5; 22; 26 & 66 cinerea var. andamanica; 260 globularia; 1627 furfuracea; 5431 globularia; 5432 laurina; 5461 linifolia; 5469 cinerea var. sumatrana.

POILANE—1581 & 1741 globularia; 2500 cinerea var. andamanica; 5128 globularia; 6335 furfuracea; 6600 globularia; 6663 furfuracea; 7990; 8073 & 8079 globularia coriaceous form; 10486; 16297 & 17567 globularia; 18219 laurina; 20004 & 22854 globularia; 23677 laurina; 25188 globularia; 27815 & 28917 laurina; 29203 globularia; 29454 laurina; 29527 linifolia; 29919 globularia.

PO KANT—130; 981 & 2044 cinerea var. andamanica; 11381 globularia; 13230 cinerea var. andamanica.

PONCE—25076 kunstleri var. surigaoensis.

PRAIN—141 cinerea var. andamanica; 680 linifolia.

PRAZER—7890 linifolia.

PUASA—1438 korthalsii; 1985 latifolia; 2256 (D.D. Wood) latericia var. latericia; 4587 elmeri; 7126 latericia var. latericia.

PUASA & ENGGOH—10685 & 55168 woodii.

PURSEGLOVE—4549; 4674 latericia var. lunduensis; 4680 latericia var. latericia; 5009 kunstleri var. kunstleri; 5041 cinerea var. patentinervia f. longipedicellata; 5047 furfuracea; 5188 & 5217 cinerea var. sumatrana; 5367 latericia var. lunduensis.

PUT—638; 669; 834; 1262 & 2751 globularia.

QUITOLES—34366 glomerata.

RACHMAT—160 cinerea var. cinerea.

RAFAEL & PONCE—20745 glomerata.

RAHMAT SI BOEEA=(RAHMAT SI TOROES)—2411 laurina; 3230 cinerea var. sumatrana; 4008 intermedia; 4413 & 5027 laurina; 5593 cinerea var. patentinervia; 6022 cinerea var. rubens; 6802 cinerea var. sumatrana; 6887 intermedia; 7023 malayana; 7414 laurina; 7982 & 8054 intermedia; 9131 cinerea var. sumatrana; 9539 laurina.

RAMOS, M.—504 & 1072 glomerata; 1278 latifolia; 1433 laurina; 1482 glomerata; 1530 latifolia; 1663 laurina; 1664 latifolia; 1706 tomentella; 1721 laurina; 1729 latifolia; 1757 laurina; 1902 latifolia; 2638; 8266 & 10957 glomerata; 13358 kunstleri var. kunstleri; 15277; 17590 & 21980 glomerata; 24276 & 24430 tomentella; 33094; 33095; 39614; 40865; 40924; 41105 & 80445 glomerata.

Ramos J. & Celestino, M.—23002 glomerata; 23062 latericia var. latericia.

Ramos & Convocar—83445 korthalsii; 83606 glomerata.

Ramos & Deroy—22574 & 22583 glomerata.

Ramos, M. & Edaño—22574; 22583; 26423; 28595; 29268; 30948 & 31461 glomerata; 33456 & 33631 kunstleri var. kunstleri; 36633 korthalsii; 36682 glomerata; 36828 korthalsii; 36854 glomerata; 36879 glomerata; 37027 korthalsii; 37079 glomerata; 37330; 37366 & 37443 korthalsii; 37444 & 44119 glomerata; 44288 korthalsii; 48143 & 49330 glomerata; 49729, 49747, 49811 & 49851 korthalsii; 75339 & 75534 glomerata.

Ramos & Pascasio—34569 glomerata.

Rao—5644 linifolia; 5727 cinerea var. andamanica.

Reillo—15421 & 15472 korthalsii.

Reinwardt—(6); (7) & (8) cinerea var. sumatrana; (9) intermedia.

Rensch—1466 cinerea var. cinerea.

Ribu & Rhomoo—4087 linifolia.

Richards—1107 cinerea var. sumatrana; 1220 laurina.

Ridley—1833 & 6447 communis; 8504 ashtonii.

Riedel—5698 cinerea var. cinerea.

Robinson—236; 237 & 238 tomentella.

Rock—1892 globularia; 2030 & 2384 erratica.

Roger, A.—806 cinerea var. andamanica; 816 linifolia.

Rogers, C. G.—142 cinerea var. andamanica; 826 linifolia.

Rosenbluth—12744 glomerata.

Rosenbluth & Tamesis—12690 glomerata.

van Rossum—63 conferta.

Roxburgh—252 linifolia.

Rutten—2103 tomentella.

Sablaya—52 tomentella.

Sadong—2648 membranifolia.

Sanusi b. Tahir—SAR 9249 kunstleri var. kunstleri.

Santapau—1316 & 1979 attenuata.

Sator—815 latericia var. latericia.

Sauveur—17 percoriacea; 24 latifolia; 111 & 112 latericia var. albifolia; 122 percoriacea.

SCHIFFNER—1980 laurina.

SCHMIDT—516 & 581 globularia; 690 erratica; 831 & 880 globularia.

SEDGWICK—3169 attenuata.

SEDGWICK & BELL—6059 attenuata.

SENADA—SAR Nos. 2027 kunstleri var. kunstleri; 10111 cinerea var. sumatrana.

SHAH, MD—62 kunstleri var. kunstleri; 72 stenophylla; 81 scortechinii; 88 stenophylla; 126 scortechinii; 471 & 520 cinerea var. patentinervia; 526 communis; 535 malayana; 536 furfuracea.

SIMMONS—704 erratica.

SINCLAIR—9006 & 9224 kinabaluensis; 9282 & 9291 laurina; 9294 curtisii var. linguiformis; 9296 latericia var. albifolia; 9298 woodii; 9299 & 9311 elmeri; 9454 & 9553 glomerata; 9885; 9907 & 9908 retusa; 10010 cinerea var. sumatrana; 10029 (Hort. Bog. IVH87) tomentella; 10183 curtisii var. arenosa; 10189 galeata; 10191 rufa; 10238 kunstleri var. kunstleri; 10244 percoriacea; 10267 rufa; 10271 & 10275 ashtonii; 10289 cinerea var. patentinervia f. longipedicellata; 10297 latifolia; 10301 galeata; 10339 cinerea var. cordata; 10340 pectinata; 10341 cinerea var. cordata; 10360 latericia var. lunduensis; 10361 cinerea var. sumatrana; 10375 latericia var. lunduensis; 10376 cinerea var. patentinervia f. longipedicellata; 10381 latericia var. lunduensis; 10442 curtisii var. amoena; 10451 rufa; 10465 kunstleri var. kunstleri; 10546 & 10547 galeata. S.F. Nos. 40280; 40368 and 40717 communis.

SMITINAND—1357 laurina; 1545 globularia; 2720 furfuracea.

SMYTHIES—SAR 12511 cinerea var. cordata.

SOEGANDIREDJA—274 laurina.

SOW—K.F. Nos. 71651 cinerea var. sumatrana; 71654 a small form of the preceding; 80161 laurina; 80168 cinerea var. cordata.

VAN STEENIS—654 & 1335 intermedia; 1349 & 2842 laurina; 3433 cinerea var. sumatrana; 3765 intermedia; 10092 mandaharan; 11200; 12614 & 12615 laurina.

VAN STRAELEN—13 cinerea var. sumatrana.

SULIT, M.D.—3224 glomerata; 6092 kunstleri var. kunstleri; 7053 & 7054 glomerata; 12456 latericia var. latericia; 14324 kunstleri var. kunstleri; 14417 & 22880 glomerata.

SULIT, M.D. & CONKLIN—17628 glomerata.

Sulit, M.D.; Mendoza & Student—20 glomerata.

Sumague—37301 glomerata.

Sutan Pennek—101 conferta.

Su'ut Ali—SAR 7746 kunstleri var. kunstleri.

Talbot—32; 41; 108; 272; 273 & 582 attenuata.

Tamesis—11932 & 11946 glomerata.

Tandom—1796 latericia var. latericia.

Teijsmann—475 cinerea var. sumatrana; 478 intermedia; 484 laurina; 1754 cinerea var. sumatrana; 1991 tomentella; 3057 cinerea var. sumatrana; 3091 mandaharan; 3475 cinerea var. patentinervia; 3550; 3620; 3640 & 3641 cinerea var. sumatrana; 3689 & 3718 laurina; 3735 cinerea var. sumatrana; 3745 furfuracea; 3791 & 3924 cinerea var. sumatrana; 5019 tomentella; 7685; 7685a; 8230 & 8674 cinerea var. sumatrana; 8679 uliginosa; 11733 cinerea var. cinerea; 11735 tomentella; 12187; 12226 & 12555 cinerea var. cinerea.

Teijsmann & de Vriese—1991 & 5019 tomentella.

Thorel—1154 globularia; 2152 cinerea var. andamanica.

Thorenaar—59; 75; 269 & 356 cinerea var. sumatrana; 189EIP 1006; 91T3P251 & T683 malayana.

Toppin—6032 linifolia.

Toxopeus—867 tomentella.

Tsang—27429 & 27516 globularia.

Utja & Wasijat—See Ja numbers.

Valera—1858 latifolia; 3816 laurina.

Vanpruk—775 globularia.

Velasco—26652 glomerata.

Verhoef—78 latericia var. latericia.

Vidal, J.—790 & 791 laurina; 1756 & 2250 globularia.

Vidal y S.S.—507; 509 & 1679 glomerata in FI & L, the K. duplicate is M. agusanensis; 3547 & 3548 korthalsii; 3549 & 3551 glomerata; 3554 & 3555 korthalsii; 3557; 3559; 3564 & 3566 glomerata; 3568 kunstleri var. kunstleri; 3571 & 3572 glomerata.

Villamil—241 latericia var. latericia.

de Voogd—463 intermedia; 1640 cinerea var. cinerea.

de Vriese—(28); (47) & (66) mandaharan.

Waalkes, J. van Borssum—402 & 587 cinerea var. sumatrana.

WALL. CAT. (WALL. HERB., KEW)—6788 (missionis) globularia; 6791 attenuata; 6794 (lanceolata Wall.) globularia & a small bit of M. fragrans mounted with it; 6801 (longifolia Wall.) linifolia; 6802a hookeriana; 6802b probably Lauraceae; 6810 (glaucescens Jack) plumulosa.

WANG, C. W.—73168 & 78230 erratica; 80634 globularia.

WARBURG—1738 laurina; 1739 cinerea var. sumatrana; 1742 tomentella; 1743 intermedia; 2499 laurina; 2500 intermedia; 3184 cinerea var. sumatrana; 11589; 11590; 13303; 13303a; 13304; 13641; 13644; 13644a & 13803 glomerata; 16718 & 16719 tomentella.

WARD, KINGDON F.—5534 erratica; 7913 cinerea var. andamanica.

WENZEL—743 & 1134 glomerata; 1913bis tomentella; 2513 & 2783 korthalsii; 2789 glomerata; 2860 kunstleri var. surigaoensis; 2979 glomerata; 3048 kunstleri var. surigaoensis; 3342 korthalsii; 3411 glomerata; 3474 & 3485 kunstleri var. surigaoensis.

WHITFORD—366 & 520 glomerata.

WHITFORD & HUTCHINSON—6026 & 9107 glomerata; 9310 korthalsii; 9385 glomerata.

WIGHT—869; 873; 1075; 2484; 2486; 2487 & 2490 attenuata.

WILLIAMS—900; 901; 2340; 2876; 2892 & 2911 glomerata.

WINCKEL—308 cinerea var. sumatrana.

WINIT—216 globularia; 265 cinerea var. andamanica; 1577 linifolia; 15195 furfuracea.

WINKLER, HUBERT—308 cinerea var. sumatrana; 2110 percoriacea; 2390 latifolia; 2460 membranifolia; 2466 & 2467 communis; 2546 membranifolia; 2753 korthalsii.

WOOD, D.D.—931 korthalsii; 1985 latifolia; 2256 (Puasa) latericia var. latericia.

WOOD, G.H.S.—A Nos. 1996 latericia var. latericia; 1997 latifolia; 2917 & 3957 latericia var. latericia; 3962 woodii; 4139 elmeri; 4665 latericia var. albifolia; 4787 laurina; 4792 latifolia—SAN Nos. 15382 latericia var. latericia; 15394 latericia var. albifolia; 15430 furfuracea; 16012 laurina; 16286 pectinata; 16322 curtisii var. linguiformis; 16669 cinerea var. alpina; 16709 latericia var. latericia; 16733 cinerea var. sumatrana; 16749 percoriacea; 16815 laurina; 16918 latericia var. latericia—K.F. Nos. 71868 kunstleri var. kunstleri; 71870 scortechinii.

Wood, G.H.S. & Charrington—SAN Nos. 15388 woodii; 16515 latericia var. latericia.

Wood, G.H.S. & Kadir b. Abdul—SAN 17049 membranifolia.

Wood, G.H.S. & Kapis b. Sisiron—SAN 15293 latericia var. latericia; SAN 16449 kinabaluensis.

Wood, G.H.S. & Kilang—SAN 16643 elmeri.

Wood, G.H.S. & Wyatt-Smith—A Nos. 4237 cinerea var. sumatrana, small form; 4400 laurina; 4484 kinabaluensis; 4578 cinerea var. sumatrana; 4582 ashtonii—K.F. Nos. 80343 & 80346 kinabaluensis; 80439 laurina.

Wyatt-Smith—K.F. Nos. 64726 scortechinii; 71059 stenophylla; 71085 furfuracea; 76413 & 76456 laurina.

Yates—1715 cinerea var. sumatrana; 1819 cinerea var. rubens.

Zainal Abidin—21 curtisii var. arenosa.

Zollinger—809 cinerea var. sumatrana; 825; 996 & 998 laurina; 1163 intermedia; 1398 & 2650 cinerea var. sumatrana.

Zschokke—15396 glomerata.

Zwickey—228 & 655 glomerata; 784 korthalsii.

J. A. le Doux

Jacques Alphonse le Doux, friend and correspondent of members of the staff of the Botanic Gardens, Singapore, for more than fifty years, died in the Johore General Hospital on 1st April, 1961, at the age of 80.

Le Doux was born at Liverpool (according to the *Sunday Times* of 2nd April), but spent his boyhood at a country house at East Molesey in Surrey, near the river Thames, opposite Hampton Court. His father had a large garden, with greenhouses containing orchids and other tropical plants, and thus began the interest in plants (and perhaps the call of the tropics) that lasted all his life. With his brother Gustave he volunteered for service in the war in South Africa, and remained in that country until 1906, when he again joined his brother, who had previously come to a tin mine in Johore.

Jacques soon turned from tin-mining to rubber-planting, in the Kota Tinggi district, where he remained for the rest of his life. After working on several estates, he established his own small rubber plantation at the 3rd mile, Mawai Road, calling it Tutankhamen Estate. There I first visited him in 1925, and found that he was known to Malays in the neighbourhood as "Tuan Jack". Later, through no fault of his own, he lost this property, and built a house for himself in an area of orchard land, which he called "The Dusun", on the other side of the road. He was there at the time of the Japanese invasion of Malaya, and was interned in Singapore during the years 1942–45. In the civilian internment camp he became friendly with George Peet, of the *Straits Times* editorial staff. Peet was impressed by le Doux's local knowledge of the countryside, its people and natural history, and after the war persuaded him to allow publication of some reminiscences in the *Sunday Times*. I remember le Doux telling me that he was very hesitant about publication, and that, though Peet wished him to write more, he doubted if he could do so. But he was persuaded to continue, and Tuan Djek's "Countryman's Journal" became a regular feature of the *Sunday Times*, so that he and his dusun, the cook and the cook's growing family, the neighbours and the plants and animals which interested him, became well known to a large public in Malaya.

Early in his planting career le Doux established contact with H. N. Ridley, and sent him specimens of plants from time to time, calling at the Gardens on his occasional visits to Singapore, and

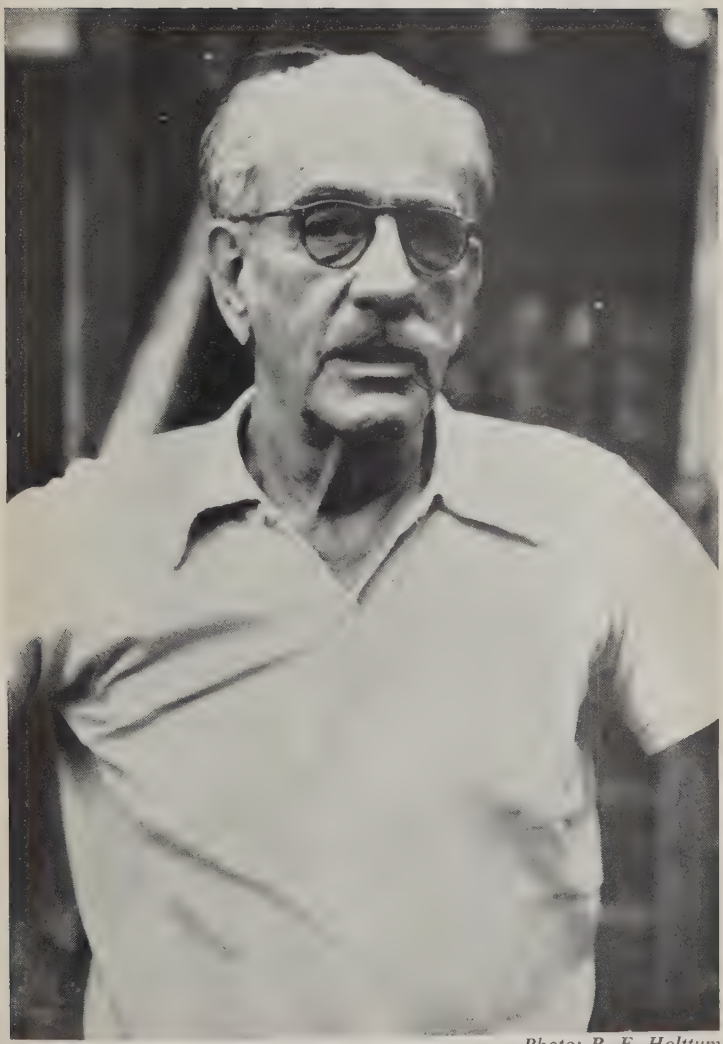


Photo: R. E. Holttum

J. A. LE DOUX

he continued this practice when I. H. Burkill followed Ridley as Director. I first met him at the Director's house, at a tea-time call, in 1922. In 1925 I stayed a long week-end with him at Easter, and we climbed Gunong Panti and also went into the Pelepah valley between G. Panti and G. Muntahak. At both localities, then and later, we found many interesting plants, some of which are apparently quite local. A year or two later he stayed for a time at a small house in Tanglin Road, Singapore, and kept a fine collection of varieties of *Spathoglottis plicata* in pots. His interest in these plants led me to look at them critically, as I had not troubled to do previously, and the results were recorded in a paper in the *Malayan Orchid Review*. This was my first study of a group of varieties of cultivated plants; it was for me a valuable experience which I owed to le Doux. I learnt from him also about his methods of cultivation of these plants, and this led to an improvement of those we had at the Gardens.

In subsequent years we corresponded and exchanged brief visits from time to time, and I learnt much from him in many ways. He had an observant eye, and noted the flowering and fruiting of the many different native trees and other plants around the dusun, as well as of his fruit trees. Among the plants he showed me in his later years were two bamboos on the bank of the stream near his house. One was the blowpipe bamboo, the other the only example I have seen in Malaya of *Gigantochloa maxima*, a variety of which is widely planted in Java; I think this species must have been brought by man from lower Burma. In 1952 le Doux wrote to me that this bamboo was flowering, and when I went to gather some flowers I walked down the road to a neighbouring kampong with him and found yet another bamboo which was previously very little known; this was *Bambusa heterostachya*, for 70 years only known from the original collection made near Malacca. Le Doux was equally interested in all kinds of animals, and corresponded frequently with zoologists at Raffles Museum, the University of Malaya, and the Institute for Medical Research.

Le Doux was a kindly and modest person, with a quiet dry humour in his conversation that made him always a good companion, whether in pleasure or adversity. He lived latterly detached from the world, which in general he appeared to regard with an amused tolerance, though upon occasion his comments could be caustic. There must be many who, like myself, remember him for his unobtrusive but stimulating help and his firm friendship. Requiescat in pace.

R. E. HOLTTUM.

Review

THE GRASSES OF BURMA, CEYLON, INDIA AND PAKISTAN (excluding Bambuseae) by N. L. Bor, Pergamon Press, Oxford, 1960. pp. 767 with 80 line drawings, indexed. £8 net.

Dr. Bor, who was formerly the Assistant Director of the Royal Botanic Gardens, Kew and before that in the Indian Forest Service where he served for many years in Assam, has produced in this volume a monumental contribution to our knowledge of the grasses not only of the sub-continent of India but of South-east Asia generally, for a substantial number of the grasses named and keyed in this volume occur both to the west as far as Tropical and Subtropical Africa and to the East as far as Queensland and Tropical North Australia.

The book consists of 2 parts—a general part dealing with morphology, dispersal, the use of grasses and with obnoxious grasses, and the second part dealing with the detailed systematics. The section on morphology is well balanced and not unexpectedly reaches the general conclusion that in the Gramineae "there exists the most extraordinary mosaic of characters". The homologies of the palea with the prophyllum are carefully worked out and the author accepts the view that the ovary is 3-carpellary. Two unexpected roles for grasses are surely that of *Garnotia arborum* which is an epiphytic in moses on tree trunks or on rocks and *Hubbardia leptoneuron* a true waterfall spray species with leaves as thin as a filmy fern.

Dr. Bor concludes that the great majority of grasslands in India are seral and "fire is the factor which maintains a grassland of tall grasses". Further "if grazing is added to fire the tall grassland is replaced by a grassland of depauperated species". Malayans will note with interest that *Imperata* "is the most aggressive of them all" and that our familiar Siam weed (*Eupatorium odoratum*) "is capable of ousting *Imperata cylindrica*". The lessons to be drawn from the proper management of lawns for the guidance of those developing grazing for animals are not drawn and perhaps this is not surprising when the phenomena of selective grazing are referred to as "choosey". However, Anker-Ladefoged's work in Ceylon indicating a necessity to match the quality of the grazing animal with the quality of the sward is quoted.

The discussion of aromatic species and their oils is valuable, and the increasing use of grasses for the manufacture of coarse papers is noted. The recommendation of *Rhynchelytrum repens* as a "most attractive subject in a garden" evokes a rueful smile as this is a familiar, if attractive, weed in many parts of Malaya.

The chapter on obnoxious grasses is mainly concerned with the well known phenomenon of hydrocyanic acid poisoning following wilting and the troublesome "weeds" exemplified by our all too familiar *Imperata* or Lalang.

In the systematic part, a number of new tribes not used before in describing the flora of India are included. The research from which the origin of many of these new tribes has originated is well exemplified by the exposition of the puzzling position of *Gymnopogon* resulting from the study of its anatomy. It would appear to be neither a number of the *Chlorideae* nor of the *Perotideae;* what then?

This multiplication of tribal names is so considerable that one wonders whether it is not going too far. For example, there are 4 new tribal names in this local flora (howbeit, dealing with an enormous area of the earth's surface) which do not appear in Hubbard's last full account of the grasses in the 2nd edition of Hutchinson's "Families of Flowering Plants" which is little more than a year older. The contrast between the Pooid sub-family with its 36 tribes and the Panicoid sub-family with 3 tribes is most striking. There is no doubt of course that it is easier to give a satisfactory key to 36 tribes in the first instance than to try and key the Pooid group as a whole, though even here the author is forced to give a paragraph of exceptions. The keys are, in fact, the substance of the descriptive portion of this work and it is pleasant to note in almost every case dimensions are expressed as ranges of size rather than absolute figures. The tribes, genera and species are all dealt with in strictly alphabetical order—the species in each genus being listed seriatim; varieties when listed appear under species. The synonymy is carefully presented with full and complete references so that the application of the international rules of nomenclature is explicit. It is always helpful, especially to the non-expert endeavouring to identify a grass, to be able to confirm keying by a careful comparison with a full description. For example, this is possible when using Dr. Stapf's descriptions in the flora of Tropical Africa. Here this can not be attempted. Again, reference to authentic herbarium material is also helpful and one would have liked to see a more generous quotation of exsiccata.

In certain cases Dr. Bor has been bold enough to use names such as e.g. *Sporobolus indicus* auctt. non (Linn.) R. Br. This indicates that "*Sporobolus indicus* (Linn.) R. Br." is a "complex which requires much field study for its resolution", a kind of problem which is familiar not only to agrostologists but to most taxonomic workers. Few botanists have, however, been bold enough to deal with it in this forthright way before. A further innovation at least in volumes dealing with grasses but quite usual for instance when dealing with orchids—is the record of two bigeneric hybrids. These are the well-known artificial hybrid *Euchlaezea mertonensis* Janaki and *Elymordeum* which is recorded from Chitral.

The student of evolution will find curious facts:—"the glumes of *Lopholepis ornithocephala* and *Latipes senegalensis* are so fantastic as to defy any rational explanation as to how or why such shapes evolve". In the two species *Panicum elegantissimum* and *Ichnanthus vicinus* "the grain, tightly enclosed between the lemma and palea, appears to turn through 90° when mature so that, instead of facing the lower lemma, it is at right angles to it. This may be of some advantage to the plant, but it is difficult to think what it might be".

There are some odd statements—thus the unnumbered *Bromus macrostachys* "has not so far been found in our area, but it is extremely probable that it will be found in Northwestern Pakistan". Again while as far as possible an illustration for each tribe has been chosen one is puzzled at the choice of *Lygeum spartum* "which may have escaped from a garden" in Kashmir, especially as this has also been chosen amongst others to garnish the dust-cover of the volume.

The book illustrates the taxonomic difficulty of this important family and the impressive way that the taxonomists at the Royal Botanic Gardens, Kew, are progressing with its treatment. It is one of the international series of monographs on pure and applied biology, the Botany Division of which has Dr. R. C. Rollins and Dr. G. Taylor as general editors.

There are remarkably few typographical errors and the paper and binding are of good quality. Nevertheless the price is surely very high?

H.B.G.

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